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DOE ORDER 5480.14, PHASE I - INSTALLATION ASSESSMENT
FOR THE BETTIS ATOMIC POWER LABORATORY

Prepared for the U.S. Department of Energy by
Westinghouse Electric Corporation
West Mifflin, Pennsylvania 15122-0079

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EXECUTIVE SUMMARY

A Phase I-Installation Assessment was completed for the Bettis Atomic Power Laboratory to satisfy the requirements of U. S. Department of Energy (DOE) Order 5480.14 Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) program. This assessment included a review of the setting of the Laboratory with respect to local weather conditions, geology and soils, hydrology and hydrogeology, and sensitive environmental settings. Laboratory procedures and practices were reviewed to establish past disposal practices for listed CERCLA hazardous substances and to establish, if any, disposal or spill locations onsite which may pose an undue risk to health, safety or the environment.

As a result of this review, Bettis had identified one location onsite that has chemical contaminants, mainly organic solvents, present in the soil and in the adjacent groundwater. The same contaminants were also identified in other groundwater discharge locations onsite. The Hazard Ranking System (HRS) completed for this location produced an overall site rating of 6.8. The individual pathway scores were: S-migration = 2.6; S-fire + explosion = 0; and S-direct contact = 4.2. This rating does not pose an undue risk to health, safety and the environment as the result of migration of contaminants from the inactive waste site. Pursuant to DOE Order 5480.14, additional Phase II through Phase V actions are not warranted. However, Bettis intends to continue environmental monitoring activities to confirm that the conclusions of this report do not change. Futhermore, any evaluations or corrective actions that may be required by environmental statutes will be performed as applicable.

There are several onsite areas that contain residual, low-level radioactivity that resulted from spills primarily in the 1950s and 1960s. These areas are controlled under the provisions of DOE Orders 5480.2 and 5820.2 and are thus excluded from the DOE 5480.14 CERCLA program. However, for the record, Phases I through V type actions have been taken on these areas. The results of Phase V type environmental monitoring have been published annually in reports distributed to the DOE, the Environmental Protection Agency (EPA), and the Pennsylvania Department of Environmental Resources. The environmental monitoring results demonstrate that these areas do not provide a threat or pose an undue risk to health, safety, or the environment.

2. INTRODUCTION

a. Background

Public Law 96-510, Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, establishes a fund for use in cleaning up hazardous substance disposal areas[1] of private sites and specifies persons who are liable for reimbursing the fund and who may be ordered to undertake cleanup activities. In response to CERCLA, the U.S. Department of Energy (DOE) issued DOE Order 5480.14, Comprehensive Environmental Response, Compensation and Liability Act Program. This order defines actions to identify and evaluate inactive hazardous substance disposal sites on DOE installations and to effect remedial action as necessary to improve control of hazardous substance migration from such sites. The DOE CERCLA Program is to be accomplished in five interdependent phases:

1. Phase I - Installation Assessment, to evaluate site history and records, to locate and identify those inactive hazardous waste disposal sites that may pose an undue risk to health, safety, and the environment as a result of migration of hazardous substances.

2. Phase II - Confirmation, to quantify, by preliminary and comprehensive environmental survey, the presence or absence of hazardous substances that may pose an undue risk to health, safety, and the environment.

3. Phase III - Engineering Assessment, to develop, evaluate, and recommend a plan for controlling the migration of hazardous substances identified in Phase II or for effecting remedial actions at the installation.

4. Phase IV - Remedial Actions, to implement the recommended site-specific remedial measures identified in Phase III. This includes the engineering, design, and actual construction of barriers to restrain migration of identified hazardous substances and/or decontamination operations.

5. Phase V - Compliance and Verification, to review monitoring data, perform any monitoring required to determine that remedial action and decontamination has been effective, establish any continuing monitoring requirements, and prepare remedial action documentation.

[1] Disposal area is any area where a CERCLA listed hazardous substance has come to be located regardless of cause.

This document has been prepared to satisfy the report requirements for the Phase I - Installation Assessment as specified in DOE Order 5480.14.

b. Authority

The Bettis Atomic Power Laboratory is owned by the U.S. Department of Energy (DOE) and operated by the Westinghouse Electric Corporation. As a U.S. Department of Energy facility, the operation is subject to the policy and procedures of the DOE. Therefore, DOE Order 5480.14 dated April 26, 1985, applies to the Bettis Atomic Power Laboratory.

c. Purpose

This Phase I-Installation Assessment report was prepared to satisfy the requirements of U.S. Department of Energy (DOE) Order 5480.14, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Program. This program entails efforts to identify and evaluate inactive hazardous substance disposal sites on DOE installations and to effect remedial actions when necessary to improve control of hazardous substance migration from sites. The Phase I report purpose is to locate and identify those inactive hazardous substance disposal sites that may pose an undue risk to health, safety and the environment as a result of migration of hazardous substances.

d. Scope

The scope of the Phase I report involved an assessment of the installation primarily with respect to onsite hazardous substance disposal practices. Included in the scope of activities were the following:

- investigations and meetings with employes who have direct knowledge of present and past operations and site conditions;
- reviews of pertinent documents such as environmental and effluent monitoring reports and results, incident investigations, spill reports, site maps and photographs, audit documentation, purchase records, shipment records, State and Federal permit documentation and site waste management plans;
- reviews of site history and mission;
- reviews of chemical inventories past and present and disposal records;
- reviews of all underground tanks;
- conducting physical inspections to validate site-specific information including evidence of environmental stress;

- use gathered information to identify locations onsite where contamination from hazardous substances exists; and

- evaluate selected sites using the EPA Hazard Ranking System

e. Methodology

The methodology used in completion of this Phase I facility assessment report has followed the outline contained in DOE Order 5480.14. Bettis initiated efforts to establish the presence of hazardous substance contamination onsite in late 1983, prior to the DOE Order. The initial effort entailed a review of past disposal and control practices for hazardous substances with employees who had direct knowledge of such matters. The discussions and investigations of late 1983 identified onsite disposal areas. Sampling and survey programs were initiated to establish the actual presence of hazardous materials at the disposal site and at other locations around the Laboratory. The data collected as part of this preliminary sampling and survey work confirmed the presence of some contaminants onsite. This led to the initiation of field investigations involving core borings, soil sampling, well installation and groundwater sampling. This field investigation confirmed the presence of contaminants in the area of the inactive waste site and in other groundwater discharge locations onsite. In concert with this effort, reviews of other installation information had been initiated to establish other areas onsite that might be considered for further investigation. Figure 1 presents a decision tree that outlines how Bettis has approached the CERCLA program.

3. INSTALLATION DESCRIPTION

a. Location, Size, Boundaries (1)*

The Bettis Atomic Power Laboratory is located in the Borough of West Mifflin, Allegheny County, Pennsylvania, approximately eight miles southeast of central Pittsburgh. Figure 2 shows the relation of the Bettis Site to the surrounding environs and Figure 3 provides a topographic map of the area immediately surrounding the site. The Bettis site is located at Longitude 79°53'55" and Latitude 40°21'37".

Allegheny County is a highly industrial urban center with a population of 1,450,085 as of the 1980 census, 26,070 of whom are residents of West Mifflin Borough. Populations residing within various distances from the Bettis site are shown in Figures 4 and 5.

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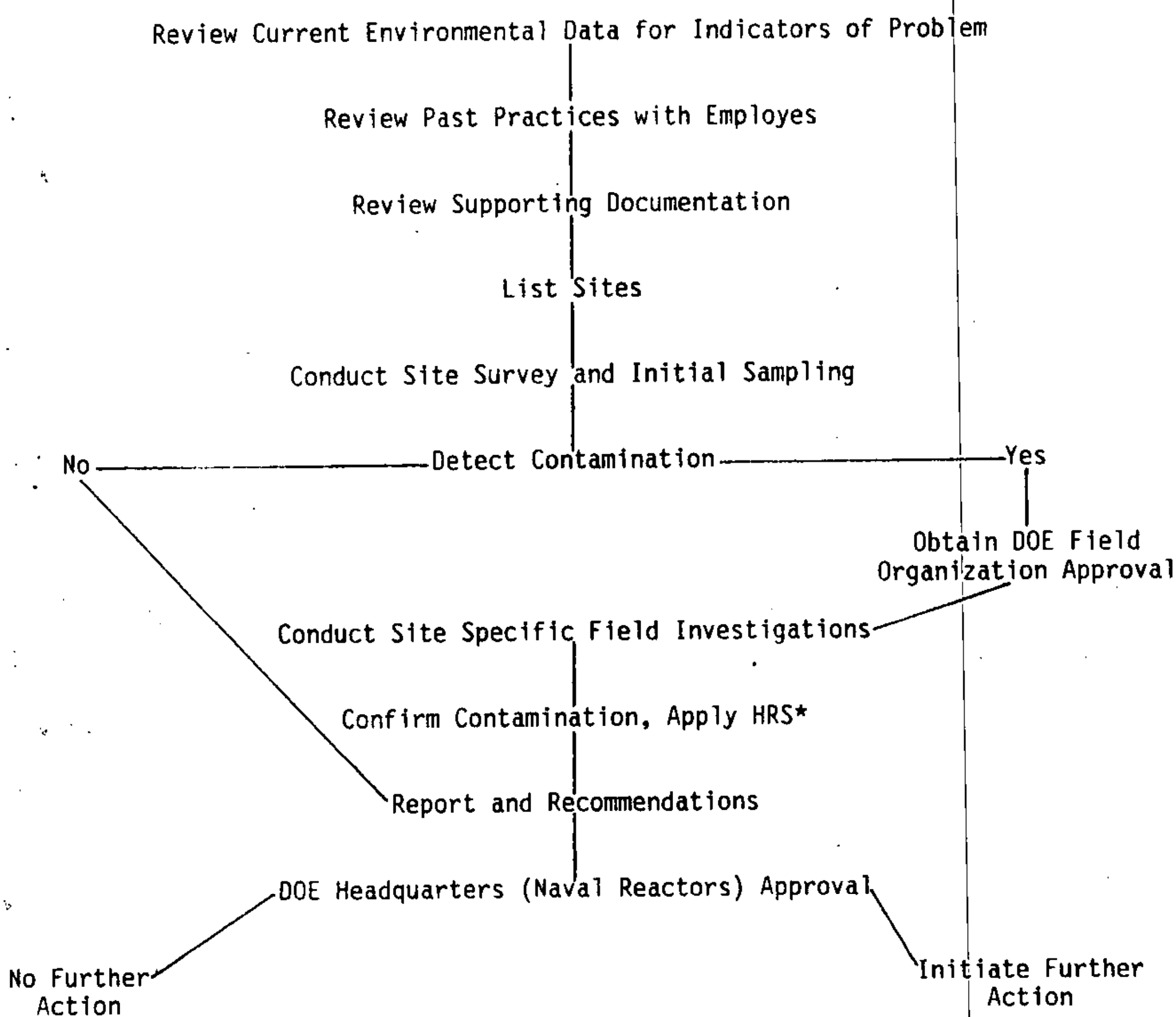
* Indicates Reference document for this section of the report.

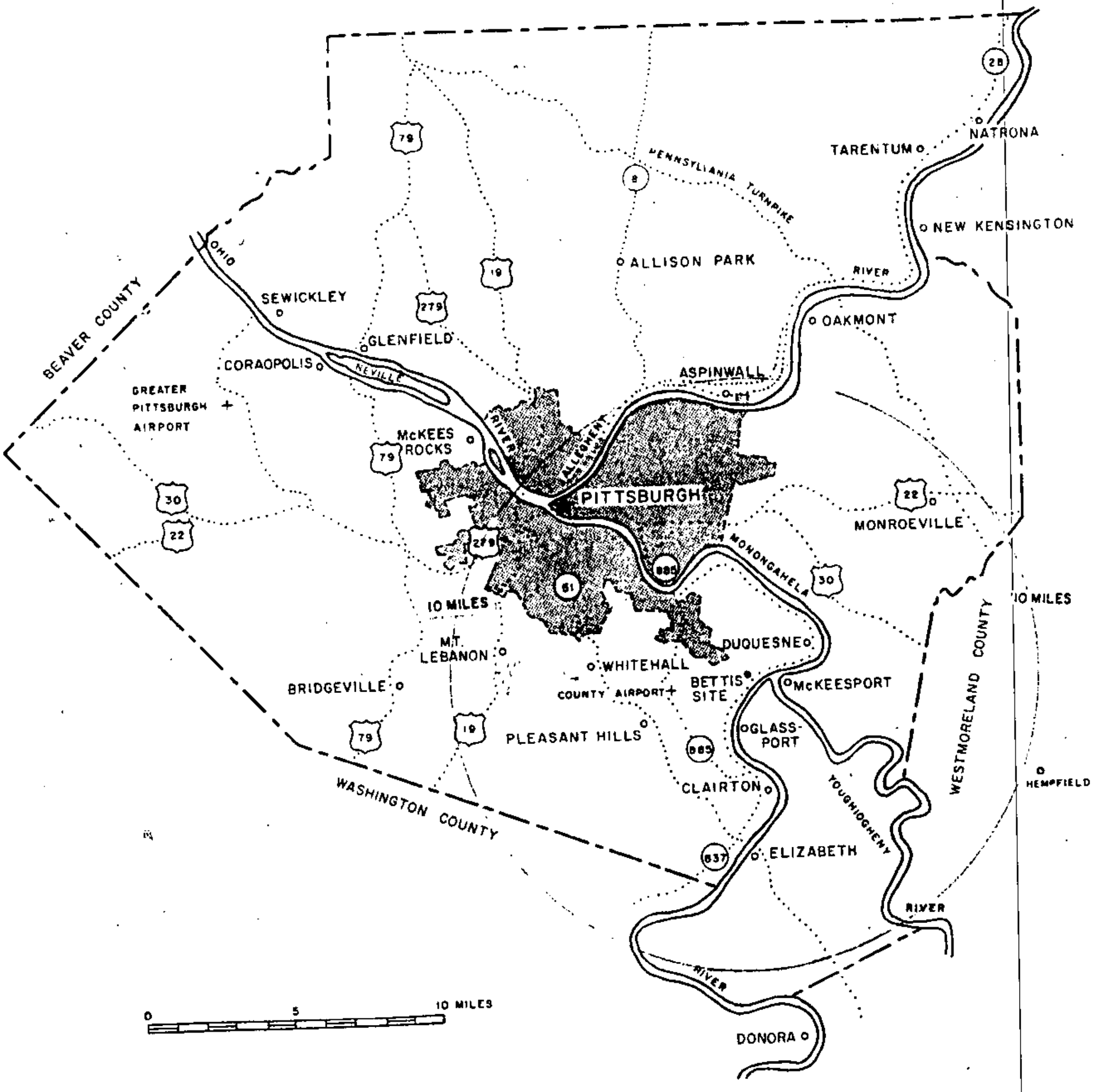
FIGURE 1

BETTIS ATOMIC POWER LABORATORY

INSTALLATION ASSESSMENT METHODOLOGY



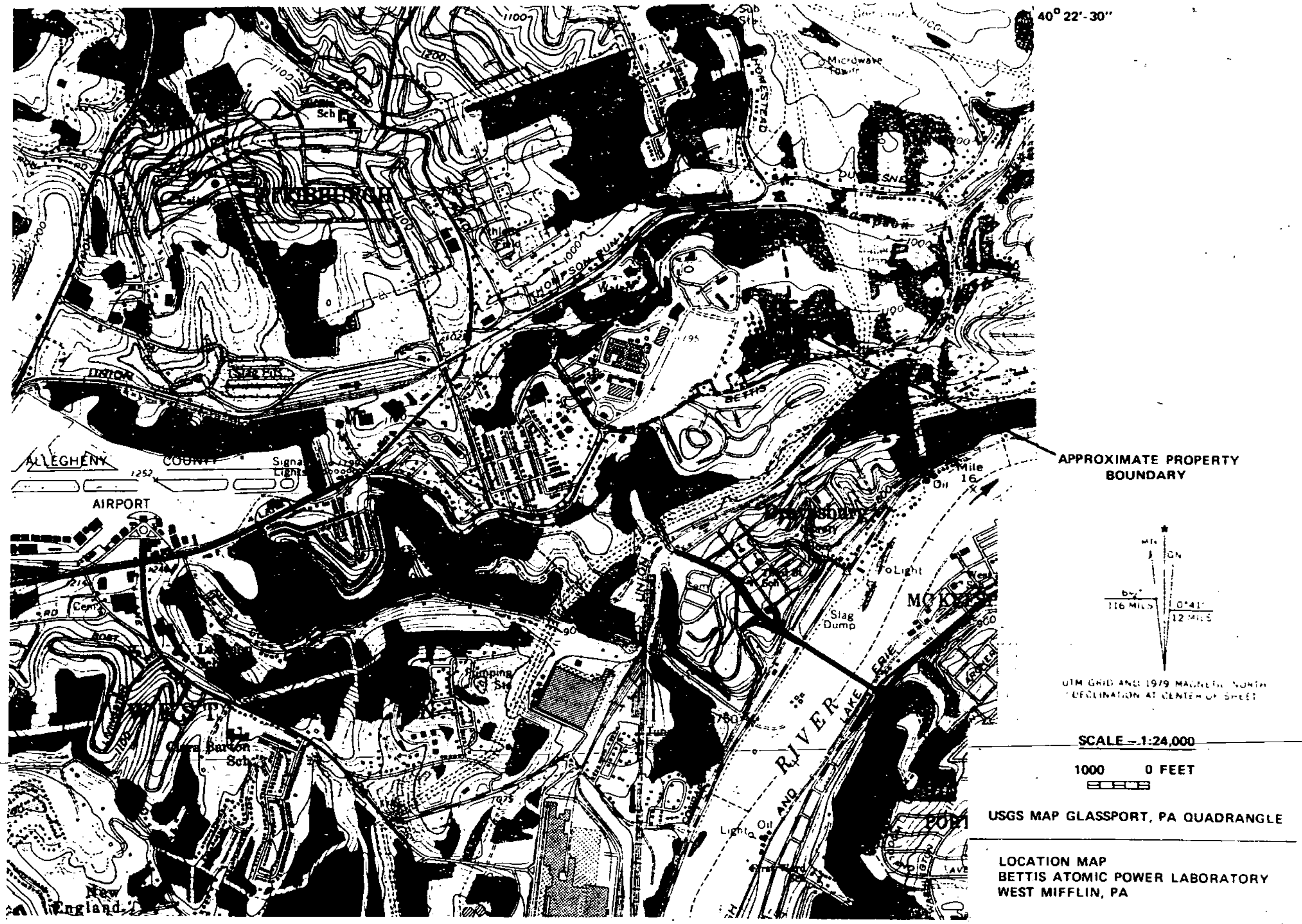
*Hazard Ranking System



RELATION OF BETTIS SITE TO THE SURROUNDING ENVIRONS

FIGURE 2

FIGURE 3

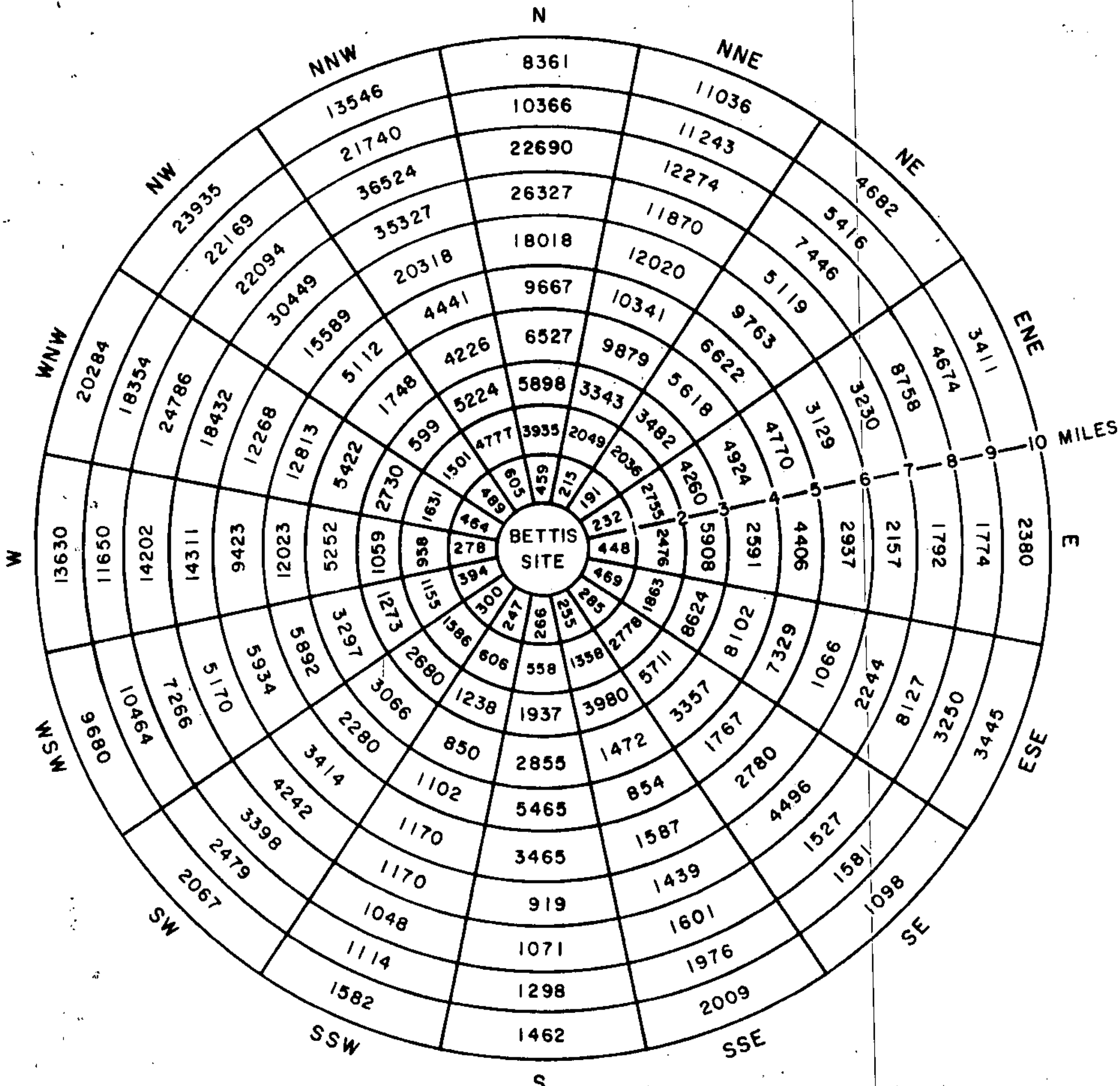


USGS MAP GLASSPORT, PA QUADRANGLE

LOCATION MAP
BETTIS ATOMIC POWER LABORATORY
WEST MIFFLIN, PA

FIGURE 4

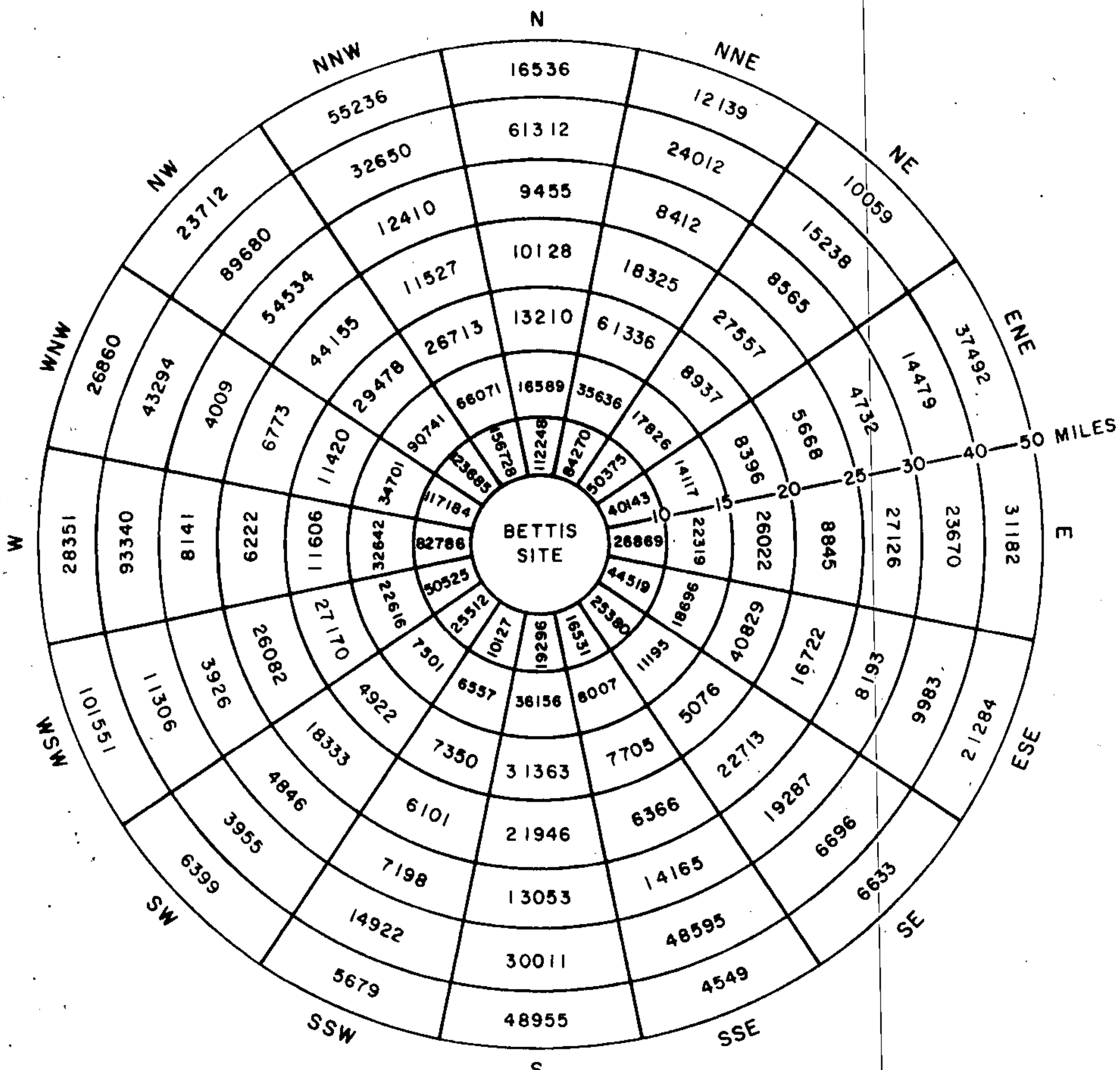
BETTIS ATOMIC POWER LABORATORY – WEST MIFFLIN, PA.
INCREMENTAL POPULATION DISBURSEMENT – BASED ON 1980 CENSUS
16 SECTORS – 0-10 MILES OUT FROM THE BETTIS SITE



1980 CENSUS DATA, PROVIDED BY OAK RIDGE NATIONAL LABORATORY 7-15-83.

FIGURE 5

BETTIS ATOMIC POWER LABORATORY—WEST MIFFLIN, PA.
INCREMENTAL POPULATION DISBURSEMENT—BASED ON 1980 CENSUS
16 SECTORS—0-50 MILES OUT FROM THE BETTIS SITE



1980 CENSUS DATA, PROVIDED BY OAK RIDGE NATIONAL LABORATORY 7-15-83.

The present Bettis site was originally developed in the late 1920s as Pittsburgh's first airport named the Bettis Air Field. Westinghouse acquired title to the Bettis field property (about 146 acres) in May 1949 along with three airplane hangars, an administration building, a terminal, and a service station. Additional adjacent properties were purchased in 1952. In 1957, approximate 201.7 acres were deeded to the Federal Government (Atomic Energy Commission). Today, the Bettis site remains a research and development facility operated by Westinghouse Electric Corporation for the U.S. Department of Energy (DOE) under the jurisdiction of the Pittsburgh Naval Reactors Office.

Most of the developed land is within a secured area with only roadways, parking facilities, and a few small buildings outside the security fence. A residential district borders the site on the east; however, because that end of the site is heavily forested, residences are remote from actual Bettis operations. On the northern boundary, an industrial district is adjacent to the site. Commercial and residential developments border the site on the south and the west. Screens of trees serve to isolate residences to the south and west of the site from Bettis activities. Two public roadways run along the length of the south perimeter of the property; a public railroad runs by the north end of the site.

b. Organization and Mission (2)

The Bettis Atomic Power Laboratory was organized in 1949 through the joint efforts of Westinghouse, the Navy, and the Atomic Energy Commission (AEC). Today, the facility is operated by Westinghouse Electric Corporation for the U.S. Department of Energy (DOE) under the jurisdiction of the Pittsburgh Naval Reactors Office. All grounds, buildings and equipment of the Bettis site are the property of the Federal Government (DOE, formerly ERDA (Energy Research and Development Administration), formerly AEC).

The primary mission of Bettis has always been directed toward the design, development, testing, and operational follow of nuclear reactor propulsion plants for Naval surface and submarine vessels.

In 1949, employing a total of 60 persons (20 of whom were engineers and scientists), the Bettis Atomic Power Laboratory became the first private industrial organization to receive a government contract to begin work on a nuclear reactor to produce propulsion power. Currently, 2,275 people are employed at Bettis; of this number approximately 970 are engineers and scientists, approximately 200 are management personnel, and the remainder are technician, craft, and clerical personnel.

Bettis' first accomplishment was the S1W prototype reactor for submarine propulsion. Bettis then focused on a functional nuclear vessel. These efforts contributed to the completion of the NAUTILUS, the country's first nuclear-powered submarine. Also, Bettis work on the prototype plant for a surface ship, and successful operation of the prototype in Idaho, were instrumental in the development of the first nuclear-powered surface ship, the cruiser LONGBEACH, and the first nuclear-powered aircraft carrier, the ENTERPRISE. The Navy currently operates over 140 nuclear-powered vessels, for most of which Bettis provides propulsion plant engineering support.

In addition to the primary objective of continued work in the development of the nuclear Navy, Bettis has also played a role in the development of landbased reactor plants. Under AEC's Naval Reactors Division, the Laboratory began work on the design and development of the first U.S. full-scale nuclear power plant for civilian use. This was the Shippingport Atomic Power Station. The Shippingport station was also used to test the first light water breeder reactor (LWBR).

Specifically, the Laboratory exists for supporting this nation's capability to deploy and maintain a modern nuclear Navy.

4. ENVIRONMENTAL SUMMARY

a. Meteorology (3,4)

Bettis lies at the foothills of the Allegheny Mountains about 8 miles southeast of the confluence of the Allegheny and Monongahela Rivers which form the Ohio. The site is a little over 100 miles southeast of Lake Erie. It has a humid, continental type of climate modified only slightly by its nearness to the Atlantic Seaboard and the Great Lakes.

The predominant type of air which influences the climate of the Bettis site has a polar continental source in Canada and moves in upon the region by way of tracks which vary from almost due north from the Hudson Bay region to a long westerly trajectory resulting from polar outbreaks into the Rockies which progress eastward. There are frequent invasions of air from the Gulf of Mexico during the summer season with resulting spells of warm, humid weather. During the winter season, air from the Gulf occasionally reaches as far north as Pittsburgh (Bettis) and causes the normal alternate periods of freezing-thawing. The last spring temperature of 32 degrees will usually occur in late April and the first in autumn in late October, to give an average growing season of about 180 days.

Precipitation is distributed well throughout the year. During the winter months, about a fourth of the precipitation occurs as snow and there is about a 50 percent chance of measurable precipitation on any day. Thunderstorms occur normally during all months except the midwinter ones, and have a maximum frequency in midsummer. The first appreciable snowfall is generally late in November and usually the last occurs early in April. Snow lies on the ground in the suburbs an average of about 33 days during the year.

Seven months of the year, April through October, have sunshine more than 50 percent of the possible time. During the remaining five months, cloudiness is more frequent because the track of migratory storms from west to east is closer to the area and because of the frequent periods of cloudy, showery weather associated with northwest winds from across the Great Lakes. Cold air drainage induced by the many hills frequently leads to the formation of early morning fog which may be quite persistent in the river valleys during the colder months.

Tables 1-3 show an accumulation of meteorological data for precipitation, snowfall, and temperature taken from the Greater Pittsburgh Airport (nearest weather station to Bettis) for the years 1955-1984. Table 4 is overall data for the year 1984, which is the most recent data available.

Local surveys and data accumulated by the U.S. Weather Bureau show that prevailing winds for the Bettis vicinity occur about 50% of the time from the southwest quadrant. Wind speeds of 5-12 mph occur about 69% of the time and less than 5 mph about 12% of the time. Wind speed-stability category frequency distribution at Allegheny County Airport (1982-1983) is shown in Figure 6. The Allegheny County Airport is one mile southwest of Bettis. Average daily temperatures during the year range from 43 to 62°F. The annual average rain and snowfall amount to 36 inches of water. Normal atmospheric conditions over the Bettis site are expected to occur about 69% of the time and isothermal and inversion conditions develop about 31% of the time. A southerly air flow predominates during the inversion conditions.

b. <u>Topography, Soils and Geology</u>

<u>Topography</u> (5, 6)

Allegheny County is situated in a rugged section of the Allegheny Plateau (see Figure 3). Stream erosion of a former plain area produced the present land surface. Bettis is situated on a plateau above the Monongahela River. The elevation of Bettis is a maximum of approximately 1200 feet. The normal pool elevation of the Monongahela River is approximately 720 feet. This puts Bettis approximately 480 feet above the Monongahela River.

<u>Soils</u> (7)

The soils at the Bettis site are residual in origin, having been formed by weathering of the underlying Monongahela Group bedrock or are the result of filling operations. The soils onsite are classified as the Culleoka and Urban Land-Guernsey Soils. The Culleoka soils are characterized as moderately deep, well drained soils formed from shale and fine grained sandstone bedrock. They generally occur on upland slopes, have moderate permeability, and normally a water table below four feet throughout the year. The surface soil can be described as dark brown, granular silt loam, while the subsoil is yellowish-brown, blocky silt loam to channery clay loam. The substrata consists of yellowish-brown, massive, very channery clay loam.

Precipitation, Years 1955-1984
Greater Pittsburgh Airport, PA

PRECIPITATION (inches)

TABLE 1

YEAR	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	ANNUAL
1955	1.34	3.24	3.69	2.61	2.59	3.20	3.61	6.77	1.75	2.79	2.89	0.40	34.88
1956	1.90	5.98	5.28	4.31	5.90	4.19	4.25	5.07	1.93	1.50	1.03	3.35	44.69
1957	1.65	1.35	2.02	4.58	2.73	4.07	3.97	0.78	4.06	1.74	2.50	4.22	33.67
1958	3.17	1.11	1.87	3.42	4.82	2.74	7.43	3.71	4.52	0.97	2.47	1.10	37.33
1959	3.99	2.15	2.11	3.33	2.56	3.70	4.25	4.04	1.34	5.94	2.43	2.78	38.62
1960	3.01	3.16	2.06	1.37	5.62	2.72	3.46	3.55	1.84	1.64	1.22	1.64	31.29
1961	1.95	3.13	3.48	5.21	2.80	4.21	5.53	2.11	1.98	2.58	3.41	1.71	38.10
1962	2.33	3.55	3.85	3.03	1.87	1.82	2.44	2.57	4.69	2.11	1.53	1.83	31.62
1963	1.96	2.09	5.28	2.39	1.57	2.40	3.45	2.31	1.40	0.16	2.54	1.24	26.79
1964	2.55	1.73	4.96	7.61	1.77	3.84	4.48	1.79	0.74	1.42	2.74	4.26	37.89
1965	3.84	2.98	3.16	1.79	1.21	2.31	1.82	3.26	4.07	2.82	2.35	0.63	30.24
1966	4.52	3.23	1.88	3.73	2.76	1.72	2.70	5.13	1.92	1.38	3.39	1.70	34.06
1967	1.06	2.54	6.10	4.41	5.21	0.90	4.54	2.67	1.61	2.05	3.07	2.22	36.38
1968	2.83	0.79	4.53	2.33	6.36	2.38	2.36	3.97	3.08	2.13	2.07	3.24	36.07
1969	2.02	0.51	1.14	2.91	1.89	3.74	4.52	2.96	0.91	2.59	2.44	3.95	29.58
1970	1.61	1.92	3.35	3.09	4.36	4.61	3.89	1.55	2.77	4.80	2.64	3.29	37.88
1971	2.29	4.04	3.20	0.48	3.87	1.41	6.82	1.23	3.86	0.84	1.94	3.24	33.22
1972	1.84	3.64	3.68	4.37	1.38	5.08	2.98	1.79	5.42	2.15	4.70	3.04	40.07
1973	2.03	1.80	3.86	4.69	5.87	3.12	2.16	3.40	3.56	4.45	2.65	2.15	39.74
1974	3.47	2.10	3.72	3.26	5.35	5.08	3.30	2.93	4.42	1.12	3.06	4.02	41.83
1975	3.34	4.64	4.62	2.27	1.84	4.58	4.38	7.56	5.06	3.46	1.77	2.90	46.42
1976	3.25	1.74	4.45	1.24	1.99	3.37	4.72	1.25	3.30	3.76	0.90	1.81	31.78
1977	2.06	0.87	4.12	3.26	2.57	2.85	3.38	2.66	3.13	2.44	2.59	3.27	33.20
1978	6.25	0.54	1.65	2.25	4.26	4.11	2.15	3.65	2.64	3.42	1.62	5.24	37.78
1979	4.80	3.12	1.32	3.17	4.49	1.73	4.31	6.84	3.60	2.46	2.43	2.29	40.56
1980	1.56	1.32	5.65	2.94	4.32	4.34	6.76	5.10	1.29	2.42	2.38	1.38	39.46
1981	0.77	4.20	2.12	4.92	2.04	8.20	3.82	0.98	4.13	1.82	1.50	3.00	37.50
1982	4.44	1.93	3.52	1.44	3.98	3.05	2.36	1.97	2.80	0.40	3.33	2.79	32.01
1983	1.19	1.58	3.50	4.33	5.24	4.82	3.32	3.13	2.42	3.67	3.94	4.27	41.41
1984	1.40	2.05	2.32	3.72	5.22	1.98	3.01	5.15	0.84	3.45	3.14	3.04	35.32
Record Mean	2.89	2.46	3.29	3.10	3.36	3.71	3.97	3.21	2.64	2.49	2.38	2.74	36.24

Average Temperatures, Years 1955-1984
Greater Pittsburgh Airport, PA

AVERAGE TEMPERATURE (deg. F)

TABLE 2

YEAR	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	ANNUAL
1955	27.0	31.4	40.5	56.1	62.1	65.1	76.9	74.2	66.1	53.3	38.9	28.9	51.7
1956	27.7	34.0	37.2	47.0	58.5	67.7	70.3	70.8	60.4	56.7	42.0	39.4	51.0
1957	25.0	34.6	39.7	52.7	60.9	70.4	71.8	70.0	64.8	49.6	42.7	35.3	51.5
1958	27.4	22.7	36.1	51.2	58.6	64.2	73.0	69.6	63.1	52.3	44.0	23.0	48.8
1959	25.3	31.8	37.0	51.3	63.9	68.6	72.7	74.9	68.3	53.8	39.0	34.8	51.8
1960	30.7	28.7	26.0	54.0	57.5	66.5	68.6	71.2	66.1	53.5	43.1	23.4	49.1
1961	22.2	32.3	41.3	44.0	55.2	65.1	70.5	71.2	68.5	55.3	42.8	31.3	50.0
1962	26.2	28.3	36.5	48.4	65.3	69.3	70.1	70.8	58.6	53.3	41.1	24.1	49.4
1963	21.1	19.3	40.7	49.0	56.5	67.2	70.8	67.7	61.3	58.8	43.7	22.4	48.2
1964	31.4	27.0	40.0	51.7	62.7	67.9	72.3	67.1	63.7	50.4	45.5	34.0	51.1
1965	28.2	28.4	35.2	49.0	65.9	66.9	69.9	69.1	64.7	48.1	41.3	37.5	50.4
1966	23.1	30.3	40.9	47.9	56.1	70.4	75.6	71.1	61.3	50.8	42.8	31.4	50.1
1967	32.3	25.6	40.2	52.2	54.3	73.0	71.5	68.8	61.1	52.5	36.8	34.8	50.3
1968	23.4	22.2	40.4	51.2	54.7	66.9	72.4	71.8	64.8	52.2	41.3	27.6	49.1
1969	26.7	29.5	34.3	51.7	60.2	69.3	72.7	69.7	63.0	52.9	39.2	26.7	49.7
1970	20.7	27.7	35.5	52.5	63.9	68.2	71.6	71.6	67.8	54.9	42.2	32.1	50.7
1971	23.7	30.4	34.3	46.0	56.6	71.4	70.2	69.6	68.5	59.5	40.4	38.8	50.8
1972	29.6	26.5	36.4	48.5	61.8	63.8	71.2	70.6	65.3	48.4	39.3	37.2	49.9
1973	29.7	28.8	48.3	49.3	56.4	70.9	73.2	73.2	66.5	56.1	44.1	33.3	52.5
1974	34.0	29.9	41.2	51.8	58.3	65.2	73.1	72.8	62.2	52.4	43.9	32.5	51.4
1975	32.6	32.1	36.3	44.3	63.0	67.8	72.8	73.0	58.8	53.3	46.3	32.9	51.1
1976	23.5	37.2	45.2	50.6	55.6	68.4	67.4	65.3	59.9	45.9	33.1	23.9	48.0
1977	11.4	26.9	43.7	50.8	63.0	63.8	71.8	68.1	64.7	50.5	45.6	31.1	49.3
1978	22.6	20.9	36.9	51.0	60.2	69.4	73.0	71.4	66.2	49.1	43.0	32.7	49.7
1979	21.4	18.0	43.1	49.7	59.1	67.7	70.3	69.6	63.4	50.9	44.7	34.6	49.4
1980	26.9	24.2	35.6	48.1	60.3	66.2	75.0	74.5	67.1	49.5	38.6	28.6	49.5
1981	20.5	31.4	35.6	51.9	58.4	68.8	72.1	69.7	61.9	49.4	40.3	29.4	49.1
1982	20.9	28.4	38.4	45.3	64.7	63.7	72.4	68.2	63.4	54.4	44.7	39.9	50.4
1983	30.0	32.6	40.7	47.1	55.8	67.8	73.0	72.8	64.4	53.0	43.5	25.4	50.5
1984	23.2	36.4	32.2	49.2	55.3	69.7	68.5	70.8	61.4	58.3	40.2	39.3	50.4
Record Mean	30.0	31.1	39.8	51.0	61.8	70.3	74.3	72.6	66.3	54.9	43.0	33.4	52.4
Max	37.6	39.3	48.8	61.1	72.3	80.5	84.3	82.5	76.4	64.6	50.8	40.4	61.5
Min	22.4	22.9	30.8	40.8	51.2	60.0	64.2	62.7	56.3	45.2	35.3	26.4	43.2

Snowfall, Seasons 1955-1956 to 1984-1985
Greater Pittsburgh Airport, PA

TABLE 3

SNOWFALL (inches)

SEASON	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	TOTAL
1955-56	0.0	0.0	0.0	T	6.5	2.6	7.3	3.2	14.5	3.3	0.0	0.0	37.4
1956-57	0.0	0.0	0.0	0.0	3.4	11.2	9.3	4.3	7.3	2.2	0.0	0.0	37.7
1957-58	0.0	0.0	0.0	1.5	1.0	4.9	12.9	7.4	8.7	1.5	0.0	0.0	37.9
1958-59	0.0	0.0	0.0	0.0	11.0	8.0	13.7	2.2	7.6	3.1	0.0	0.0	45.6
1959-60	0.0	0.0	0.0	T	4.3	11.5	2.2	21.8	21.3	1.1	0.0	0.0	62.2
1960-61	0.0	0.0	0.0	0.1	2.6	20.8	22.7	22.5	1.4	5.9	T	0.0	76.0
1961-62	0.0	0.0	0.0	T	2.2	5.6	4.0	8.6	19.1	3.6	0.0	0.0	43.1
1962-63	0.0	0.0	0.0	1.8	T	11.9	12.7	20.4	4.5	0.3	1.8	0.0	53.4
1963-64	0.0	0.0	0.0	T	5.8	16.4	20.3	13.7	6.1	0.3	0.0	0.0	62.6
1964-65	0.0	0.0	0.0	T	1.6	6.1	10.6	10.4	13.3	0.2	0.0	0.0	42.2
1965-66	0.0	0.0	0.0	0.2	0.2	1.8	24.6	6.9	8.5	2.7	3.1	0.0	48.0
1966-67	0.0	0.0	0.0	0.0	5.1	7.8	4.5	21.7	20.0	0.5	0.0	0.0	59.6
1967-68	0.0	0.0	0.0	T	10.1	7.9	15.4	6.1	11.0	T	0.0	0.0	50.5
1968-69	0.0	0.0	0.0	T	2.7	13.3	6.5	4.0	3.9	0.0	T	0.0	30.4
1969-70	0.0	0.0	0.0	0.4	7.9	20.6	12.6	13.0	16.1	0.1	0.0	0.0	70.7
1970-71	0.0	0.0	0.0	T	0.1	10.1	12.1	20.6	16.8	0.2	0.0	0.0	59.9
1971-72	0.0	0.0	0.0	0.0	10.5	0.7	4.9	24.2	9.8	1.8	0.0	0.0	51.9
1972-73	0.0	0.0	0.0	1.8	6.1	2.9	3.4	6.1	4.6	1.4	T	0.0	26.3
1973-74	0.0	0.0	0.0	0.0	0.8	4.8	4.9	2.2	2.3	1.6	T	0.0	16.6
1974-75	0.0	0.0	0.0	T	2.6	21.2	10.1	13.9	9.8	1.1	0.0	0.0	58.7
1975-76	0.0	0.0	0.0	0.0	1.9	3.8	21.8	3.3	4.3	0.5	0.0	0.0	35.6
1976-77	0.0	0.0	0.0	T	6.6	7.9	26.5	6.4	0.9	1.3	T	0.0	49.6
1977-78	0.0	0.0	0.0	T	3.3	9.1	40.2	5.4	4.0	0.2	0.0	0.0	62.2
1978-79	0.0	0.0	0.0	0.0	2.3	3.2	18.2	13.7	2.0	1.4	0.0	0.0	40.8
1979-80	0.0	0.0	0.0	T	1.1	1.1	7.8	6.2	7.9	T	0.0	0.0	24.1
1980-81	0.0	0.0	0.0	T	9.7	6.3	12.5	11.9	7.6	T	0.0	0.0	48.0
1981-82	0.0	0.0	0.0	T	0.6	11.5	13.4	3.6	12.2	3.8	0.0	0.0	45.1
1982-83	0.0	0.0	0.0	T	0.1	8.8	3.9	12.0	4.3	1.0	0.0	0.0	30.1
1983-84	0.0	0.0	0.0	0.0	6.1	10.5	10.8	11.4	10.4	T	0.0	0.0	49.2
1984-85	0.0	0.0	0.0	0.0	1.5	4.8							
Record Mean	0.0	0.0	0.0	0.2	3.8	8.3	12.1	10.0	8.7	1.4	0.2	0.0	44.7

METEOROLOGICAL DATA FOR 1984

PITTSBURGH, GRTR. PITT. AIRPORT PENNSYLVANIA

LATITUDE: 40°30' N LONGITUDE: 80°13' W ELEVATION: FT. (grd) 1137 (msl) 1225 TIME ZONE: EASTERN WBAN: 94823

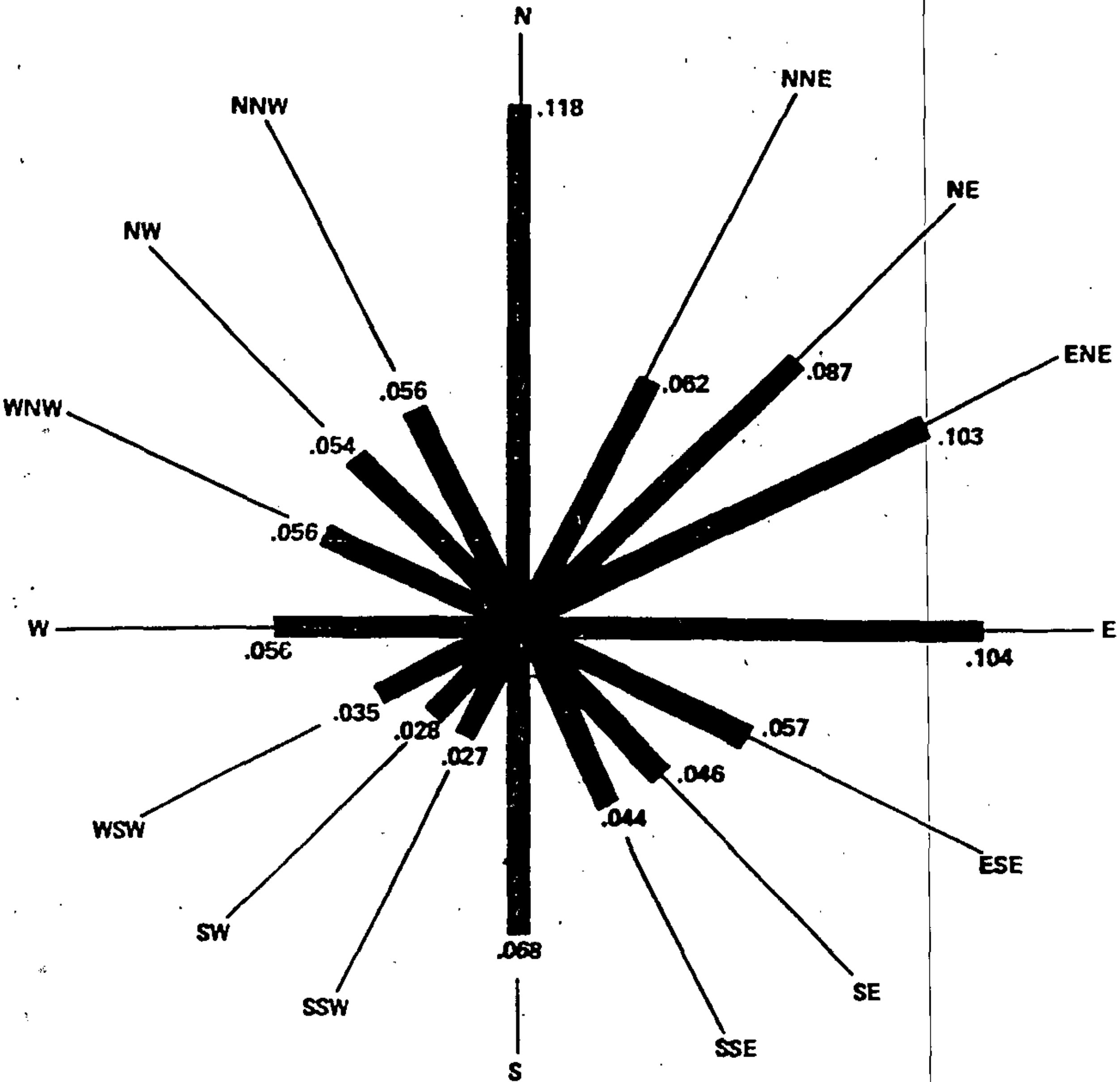
	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F:													
Averages													
-Daily Maximum	30.6	45.3	41.1	59.2	65.6	81.9	79.4	80.5	72.7	67.0	49.6	48.0	60.1
-Daily Minimum	15.7	27.4	23.3	39.1	45.0	57.4	57.5	61.1	50.0	49.6	30.8	30.5	40.6
-Monthly	23.2	36.4	32.2	49.2	55.3	69.7	68.5	70.8	61.4	58.3	40.2	39.3	50.4
-Monthly Dewpt.	13.4	25.9	21.1	33.7	42.1	52.6	57.4	59.3	49.0	47.7	30.8	32.3	38.8
Extremes													
-Highest	47	66	76	78	83	91	87	88	88	79	75	66	91
-Date	26	12	20	30	22	13	23	10	22	27	1	28	JUN 13
-Lowest	-15	9	3	27	32	45	45	48	36	37	16	9	-15
-Date	21	1	9	1	16	2	8	21	29	2	22	7	JAN 21
DEGREE DAYS BASE 65 °F:													
Heating	1293	823	1008	471	305	16	12	7	165	214	734	790	5838
Cooling	0	0	0	3	12	165	127	194	63	13	0	0	577
% OF POSSIBLE SUNSHINE	32	35	40	46	42	62	62	58	57	38	45	27	47
AVG. SKY COVER (tenths)													
Sunrise - Sunset	8.1	7.9	7.8	7.6	7.9	6.4	6.5	6.7	5.9	7.6	6.2	7.7	7.2
Midnight - Midnight	7.6	7.1	7.4	7.1	7.5	6.0	5.9	6.5	5.2	6.7	5.8	7.2	6.7
NUMBER OF DAYS:													
Sunrise to Sunset													
-Clear	2	3	3	3	2	7	3	4	8	2	8	4	49
-Partly Cloudy	9	7	8	9	9	10	13	12	10	10	9	6	112
-Cloudy	20	19	20	18	20	13	15	15	12	19	13	21	205
Precipitation .01 inches or more	15	14	16	15	17	9	12	14	10	16	15	15	168
Snow, Ice pellets 1.0 inches or more	4	3	3	0	0	0	0	0	0	0	0	2	12
Thunderstorms	0	1	1	3	5	6	6	6	0	1	1	0	30
Heavy Fog, visibility 1/4 mile or less	0	4	2	1	1	0	1	4	1	7	0	3	24
Temperature °F													
-Maximum													
90° and above	0	0	0	0	0	1	0	0	0	0	0	0	1
32° and below	14	6	9	0	0	0	0	0	0	0	2	4	35
-Minimum													
32° and below	31	20	28	5	1	0	0	0	0	0	21	20	126
0° and below	4	0	0	0	0	0	0	0	0	0	0	0	4
AVG. STATION PRESS. (mb)	976.1	970.5	970.5	967.8	971.2	972.7	973.6	973.4	977.0	977.7	975.6	975.6	973.6
RELATIVE HUMIDITY (%)													
Hour 01 (Local Time)	66	73	71	65	71	67	82	81	77	78	77	79	74
Hour 07 (Local Time)	72	77	75	70	71	68	83	82	81	80	81	83	77
Hour 13 (Local Time)	61	60	60	49	54	45	53	58	49	61	63	71	57
Hour 19 (Local Time)	64	64	61	56	58	47	60	65	60	66	70	76	62
PRECIPITATION (inches):													
Water Equivalent													
-Total	1.40	2.05	2.32	3.72	5.22	1.98	3.01	5.15	0.84	3.45	3.14	3.04	35.32
-Greatest (24 hrs)	0.44	0.83	0.98	0.75	1.25	0.70	0.87	1.08	0.18	1.00	1.17	0.61	1.25
-Date	23-24	27-28	28-29	4	28	30	PM- 1	4	23-24	21-22	4- 5	29-30	MAY 28
Snow, Ice pellets													
-Total	10.8	11.4	10.4	T	0.0	0.0	0.0	0.0	0.0	0.0	1.5	4.8	38.9
-Greatest (24 hrs)	3.0	7.5	4.4	T	0.0	0.0	0.0	0.0	0.0	0.0	0.9	4.5	7.5
-Date	10-11	28-29	PM- 1	22							20	5- 6	FEB 28-29
WIND:													
Resultant													
-Direction (!!)	257	247	307	249	257	266	253	275	249	275	241	236	256
-Speed (mph)	4.1	2.8	2.8	1.2	4.5	2.5	2.3	2.0	0.8	0.5	3.7	5.0	2.5
Average Speed (mph)	9.0	9.3	10.5	10.0	9.1	7.4	5.8	5.8	7.5	6.5	8.8	9.5	8.3
Fastest Obs. 1 Min.													
-Direction (!!)	27	23	29	22	24	31	29	34	31	23	26	24	24
-Speed (mph)	24	26	29	36	37	28	35	25	24	23	29	28	37
-Date	8	19	11	30	11	13	11	7	26	3	28	28	MAY 11
PEAK GUST													
-Direction (!!)	W	SW	W	SW	SW	NW	W	W	NW	S	SW	W	W
-Speed (mph)	31	40	43	53	46	47	56	35	32	35	40	41	56
-Date	8	19	11	30	11	13	11	7	26	19	15	22	JUL 11

(!!) Indicates last day of previous month

TABLE 4

WIND ROSE*
ALLEGHENY COUNTY AIRPORT (1982-1983)

FIGURE 6



*FRACTION OF TIME THE WIND BLOWS INTO SECTOR

WIND SPEED — STABILITY CATEGORY FREQUENCY DISTRIBUTION (1) ALLEGHENY COUNTY AIRPORT (1982-1983)

PASQUILL (2) STABILITY CLASS	WIND SPEED, MPH 0-4	5-7	8-12	13-18	19-24	>24
A	.00822	.00411	0	0	0	0
B	.01438	.03116	.00616	0	0	0
C	.00753	.03048	.05137	.00514	.00034	0
D	.02500	.11062	.24178	.16986	.00685	.00034
E	0	.06233	.06027	0	0	0
F	.01815	.09418	0	0	0	0
G	.05171	0	0	0	0	0

(1) The sum of fractions over all wind speeds and stability classes must equal 1.0.
(2) Stability Class D is a neutral condition , Classes E through G lead to more stable and inversion conditions, and Classes C to A lead to less stable and turbulent conditions.

The Urban Land-Guernsey soils are described as variable consisting of highly disturbed land resulting from cut and fill operations and subsequent coverage with urban works. These soils occur in a complex pattern with Culleoka soils which are described above. The Guernsey soils are characterized as deep, well drained soils with a slow permeability and a winter water table within 1 or 2 feet of the surface. This soil type is formed from interbedded clay shale, shale and limestone bedrock.

Geology (5, 6, 8)

The geologic formations that underly the portion of Allegheny County in which Bettis is located are part of the Pennsylvanian System. The Monongahela, Conemaugh and Allegheny Groups, all part of the Pennsylvanian System, underly the site. The bedrock units of the area dip to the southwest a few feet per mile. The underlying strata contain structural folds called anticlines and synclines. The axes of these folds trend about N30°E. The Monongahela Group, the uppermost group, includes beds of limestone, variable shales, discontinuous layers of sandstone and coal beds. Several of these coal beds have significant economic importance. The base of the Pittsburgh coal marks the end of the Monongahela Group. The Monongahela Group ranges in thickness from 300 to 400 feet. The Monongahela Group, in general, is not a good yielding aquifer due to undermining and streams cutting through many of the formations.

Some of the important beds in the Monongahela Group are the Uniontown limestone, Benwood limestone, Sewickley sandstone, Fishpot limestone, Pittsburgh sandstone, and the Redstone and Pittsburgh coal.

Extensive mining of the Pittsburgh coal seam has occurred to the west and south of the site as well as under the Bettis site. The Pittsburgh coal seam lies about 200-250 feet below the active portion of the site. Most of the Pittsburgh coal that can be mined has been removed.

The Conemaugh Group is much less calcerous than the Monongahela Group. It consists mainly of sandstone and shale with smaller amounts of coal and limestone. In the portions of the county where Bettis is located, the Conemaugh Group is overlain by the Monongahela Group. The Conemaugh Group can yield water in the range of 1 or 2 gpm to 100 gpm. The yields of wells in the Conemaugh Group vary depending on site specific conditions.

The rocks of the Allegheny Group are composed of shales, sandstones, some limestones, and some coal. In the southern portion of Allegheny County this group is too deep to serve as an aquifer for well usage.

Core borings taken onsite for various reasons confirm that the bedrock consists of layers of limestone, shale, and sandstone. One bore drilled to an elevation of approximately 1075 feet (120 feet below the surface) did not reveal the presence of any appreciable coal.

Table 5 presents a generalized cross section of the geology of the rock strata beneath the Bettis site.

c. Hydrology and Hydrogeology

Hydrology

The surface water from the Bettis site flows into Bull Run. Bull Run originates on the Bettis site and flows approximately 1.4 miles before joining Thompson Run which empties into the Monongahela River in Duquesne.

The waters in Bull Run originating from the site include once-through non-contact cooling water, storm water runoff and some process waters. Based on recorded monthly flow data, the flow from the site in 1985 ranged from 0.31 cfs to 0.85 cfs with an average flow of 0.52 cfs. The flow can be compared to that of the Monongahela River at the Braddock gage station below Bettis where the average flow is approximately 12,150 cfs. Because much of the developed area of the Laboratory is covered by buildings or paved areas such as roadways and parking lots, the discharges from the site can increase significantly during periods of heavy rain.

Because of the location and elevation of the Bettis site, flooding from local streams or rivers is not possible. Some minor bank overflowing from Bull Run may occur downstream from the site during extreme precipitation events.

Hydrogeology (5, 6, 8)

The Bettis site is underlain by the geologic units of the Pennsylvanian Monongahela Group. The Monongahela Group is not an important local aquifer. Well yields from the Monongahela Group range from less than 1 to 30 gpm.

In general, the geologic formations under the Bettis site are part of a regional trough that plunges (becomes progressively lower) S30°W at a rate of 20 to 30 feet per mile. Secondary folding subparallel to the major plunge has created anticlinal and synclinal structures whose limbs rise or dip at varied rates. The topographic features of the area such as high hills cut by major stream valleys greatly effects the direction and depth of water tables.

TABLE 5

GENERALIZED SECTION OF ROCK STRATA BENEATH THE BETTIS LABORATORY

Classification				
System	Group	Formation	Strata	Remarks
PENNSYLVANIAN	Monongahela	Pittsburgh	Cyclic sequences of shale, limestone, claystone, and coal.	Extends from at or near surface down to Pittsburgh coal.
			Pittsburgh coal seam is bottom stratum.	Mined out about 200 feet below Bettis.
	Conemaugh	Casselman	Cyclic sequences of sandstone, shale, silty, claystone ("red beds"), and thin limestone and coal.	Coal deposits of this group not normally mined. Formation is about 250-300 feet thick; base is near normal level of Monongahela River.
		Glenshaw	Cyclic sequences of sandstone, shale, red beds, and thin limestone and coal; fossiliferous limestone.	Formation is 300 to 380 feet thick.
	Allegheny	Freeport	Upper Freeport coal seam is top stratum.	Major coal bed, 600 to 630 feet below level of Pittsburgh coal.
	Pennsylvanian system rocks extend down to about sea level.			

There may be subregional groundwater regimes where the discharge of the groundwater is to local streams. In cases where the stream channels lie below the water table, some aquifers may discharge on valley slopes.

The extensive undermining in the area surrounding Bettis has affected the groundwater flow. Settling associated with the mining has resulted in fractures in many of the overlying geologic units resulting in the draining of these units or disturbance of previous flow paths.

Locally, groundwater flow may be affected by perched water tables. Perched water tables occur where an impermeable layer exists which prevents the downward flow of water to the aquifer. The impermeable layer may be rock or a very heavy clay.

Hydrogeologic investigations indicate that both undermining and perched water tables may influence the groundwater regimes under the Bettis site. A study performed in 1968 by a consultant concluded that the site groundwater is influenced by undermining and that localized perched water tables exist. Groundwater elevations found during this study, conducted during the summer months, ranged from Elevations 1156 to 1178 feet, the higher elevation being associated with the perched water table. The top of the water table was found in either a shale or limestone layer. A foundation investigation study in the same general area in 1981 did not encounter groundwater in any of the test borings. These test borings were drilled only to a maximum elevation of 1179.5 feet.

Depths to groundwater encountered in the inactive waste site investigation ranged from Elevations 1134 to 1119 in test borings drilled at the base of the hillside site (see Section 5).

There are several springs onsite where groundwater discharges to the surface. Most notable are the Buono Farm Spring and the Northeast Spring (see Figure 7). The interconnection of these springs with the local groundwater regimes is not thoroughly understood.

In general, the groundwater quality in southwestern Pennsylvania can vary considerably. Groundwater in the younger geologic formations is low in solids. Water from older formations is usually hard and may contain high levels of minerals such as iron. Iron appears to be the most naturally occurring pollutant in the local groundwater.

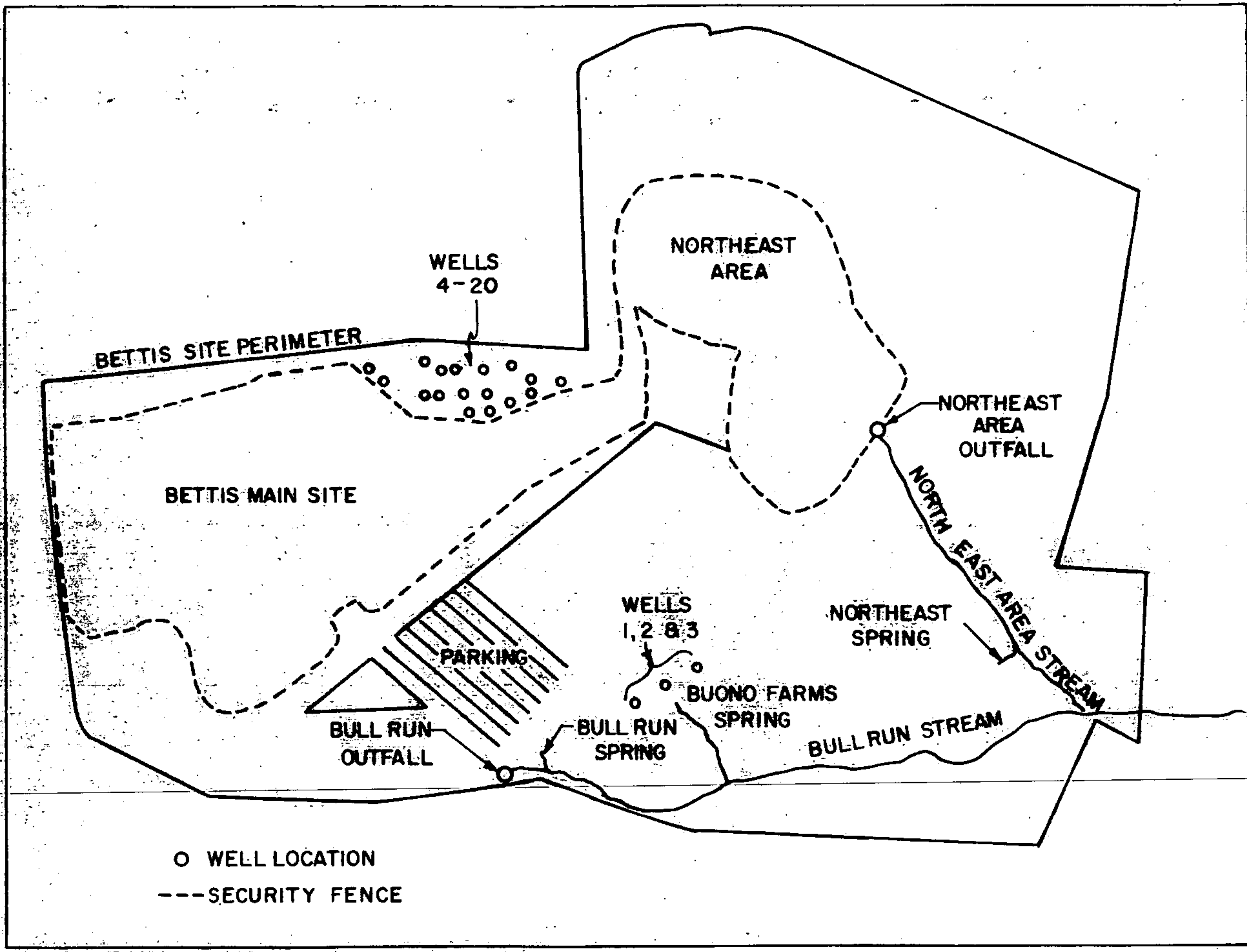


FIGURE 7 LOCATIONS OF SPRINGS & WELLS

d. Water and Air Quality

Water Quality

The Bettis Laboratory discharges liquid effluents from the plant through both the storm and sanitary sewer systems. The sanitary sewer system at Bettis currently discharges into the West Mifflin Borough sewer system and is treated at the Thompson Run Sewage Treatment Plant. Until approximately 1961 the Laboratory was served by an onsite sewage treatment plant consisting of coagulation and filtration and by several septic tank systems. The original air field buildings were served by septic systems until the buildings were tied into the onsite treatment plant in about 1950. In about 1961, the onsite treatment was eliminated and the sewer system tied into the local municipal system. The old sewage treatment plant has since been dismantled and the filter beds removed.

The Bettis storm sewer system discharges through two outfalls, identified as the Bull Run and the Northeast Area Outfalls (see Figure 7). A third outfall in the Northeast Area was eliminated in 1975 when a pump station was installed to direct the flow from this outfall into the existing Northeast Area Outfall. Approximately 1.2×10^8 gallons of water discharged through the outfalls in 1985. Approximately 62% of the flow was released through Bull Run and the remaining 38% through the Northeast Area. Both stations are equipped with flow monitoring devices and composite sampling equipment. These discharges are covered by a National Pollutant Discharge Elimination System (NPDES) Permit. The principal sources of flow in the storm sewers are once-through non-contact cooling water, surface runoff and process water. There is no treatment of the discharges.

The discharges comprise most of the flow of Bull Run. Bull Run empties into Thompson Run about 1.4 miles below the site. Thompson Run flows about 2.6 miles before emptying into the Monongahela River in the City of Duquesne. The Monongahela River is used as a raw water source for public water supply for surrounding communities. There are no known wells within three stream miles of the site which are used for drinking water or irrigation purposes (6). There are also no known surface water intakes for drinking water within three stream miles of the Bettis site.

Bettis maintains an extensive monitoring program for the storm sewer discharges. A description of the monitoring program is provided below:

Samples of effluents discharged through the Bull Run and Northeast Area Outfalls are collected on at least a monthly basis. Monthly, 24-hour composite and grab samples are collected and analyzed for pH, fecal coliform, suspended solids, and temperature. Quarterly, composite and grab samples are collected and analyzed for alkalinity, aluminum, arsenic, chromium (hexavalent), copper, cyanide (free), dissolved oxygen, fluoride, iron (dissolved), iron (total), lead, nickel, nitrate, nitrite, oil and grease, phenols, dissolved solids, threshold odor, organic carbon and zinc. Also, composite and grab samples are collected and analyzed for ammonia, boron, chemical oxygen demand, chloride, chromium (total), color, cyanide (total), organic nitrogen, potassium, sodium, specific conductance, and surfactants at least once during the year. In addition, Bull Run and Northeast Area effluents are collected and analyzed for volatile halogenated organics. The flow from the outfalls is constantly monitored.

Grab samples of the influent municipal water supply, which comprises a significant portion of the plant discharges, are collected and analyzed for the same parameters and at the same frequencies described above for the Bull Run and Northeast Area effluents.

Samples are collected and analyzed using accepted procedures and methods such as those approved by the Environmental Protection Agency (EPA) in Title 40 Code of Federal Regulations.

The results of the monitoring program for 1985 are presented in Appendix A. The Bettis evaluation of these results concludes that the operations of the Bettis Laboratory are resulting in no significant impact on the local water quality.

Bettis has initiated a program of groundwater monitoring to establish background levels and site contributions of chemical pollutants. The groundwater is sampled at springs and seeps located around the Bettis property. In addition, monitoring wells were installed at the site in November 1985. These wells are also being used to establish the quality of the groundwater. Further discussion of the monitoring well installation and sampling is contained in Section 5.

Samples are collected using accepted collection methods and analyzed using only approved protocols. A summary of the groundwater analysis results for 1985 is contained in Appendix B.

The samples indicate the presence of some trihalomethane compounds in the plant discharges and some of the groundwater. These compounds are also found in the influent municipal water which comprises the majority of the dry weather flow in the discharges and is suspected to contribute through leaking lines, etc. to the flow in some groundwater seeps. The presence of man-made organics such as tetrachloroethylene and trichloroethylene in the groundwater and wells represents a situation which will require additional analysis and evaluation.

Air Quality

The sources of air effluents at Bettis include discharges from combustion units such as boilers. These units are operated on natural gas and/or fuel oil. Estimates of their effluent discharges indicate that the discharges are well within limits imposed by local, state and federal laws.

e. Environmentally Sensitive Conditions (9, 10)

The Bettis Laboratory was reviewed for environmentally sensitive conditions. This was accomplished using the Bettis Environmental Assessment and following the Pennsylvania Department of Environmental Resources (DER) Environmental Assessment Process (EAP). The DER/EAP is used to review environmental, social and economic conditions for selected waste disposal sites but serves as a good review of sensitive factors for any facility. Among the topics reviewed were the location of the site with respect to: (1) a corridor of a stream or river designated as a national or state, wild, scenic or recreational river in accordance with the National Wild and Scenic Rivers Act of 1968 or the Pennsylvania Scenic Rivers Act; (2) a stream or river listed as 1-A priority for study by the DER as a wild, scenic or recreational river; (3) a unit of the National Parks system, a state or county park or a recreation area operated by the Army Corps of Engineers; (4) the Appalachian Trail; (5) a national natural landmark designated by the U.S. Park Service or a natural area or wild area designated by the PA Environmental Quality Board; (6) a national wildlife refuge, national fish hatchery or national environmental center; (7) property owned by the PA Historical and Museum Commission; (8) a historic site listed in the National Register of Historic Places; (9) state forest or game lands; (10) an area which is the habitat of a rare, threatened, or endangered species of plant or animal protected by the Federal Endangered Species Act of 1973 or recognized by the PA Fish Commission or Game Commission; (11) prime farmland as indicated in the U.S. Soil Conservation Service County Soil Survey; (12) wetlands; (13) a Special Protection Watershed as designed in Chapter 93 of the Rules and Regulations of the PA DER; (14) a 100 year flood plain; (15) public water supply systems; and (16) landslides, sinkholes or mine subsidence prone areas.

After reviewing the topics above, it was concluded that Bettis does not lie within an environmentally sensitive area. An exception to this conclusion is that Bettis is located within the landslide and mine subsidence prone area of western Pennsylvania. While the developed area of the site is considered free of landslide hazards, steep slopes on the northern and eastern edges of the site could be affected. These areas are stabilized by vegetative growth. The probability of mine subsidence is considered very low for the site, based primarily on the depth to the mines under the site.

The only biological pathway which Bettis could impact appears to be through contact or usage of water discharged from the site. References indicate no direct usages of the surface water or groundwater from the site for drinking or agarian purposes. The nature of Bull Run (low, intermittent flow) does not lend itself to the development of a diversified aquatic ecosystem which could be affected by Bettis activities. Based on this information there is little concern that Bettis is providing a negative environmental impact.

5. FINDINGS

a. Employe Interviews

As part of the effort to determine the existence of potential onsite disposal and spill areas, several meetings were held in the fall of 1983. These meetings included representatives of the present Environmental Engineering group and selected employes who had direct knowledge of or were directly involved in the generation and/or disposal of waste materials at the Laboratory since its inception. These individuals represented a segment of the Laboratory (waste producers such as shop and laboratory managers, facilities staff such as plant engineers and grounds and maintenance supervisors and surveillance personnel including individuals involved in industrial safety and fire protection) who would have been aware of the types, quantities and locations of onsite waste disposal or spills. These personnel have an average of twenty five years experience with the Laboratory and some of their service dates back to the inception of the Laboratory in 1949.

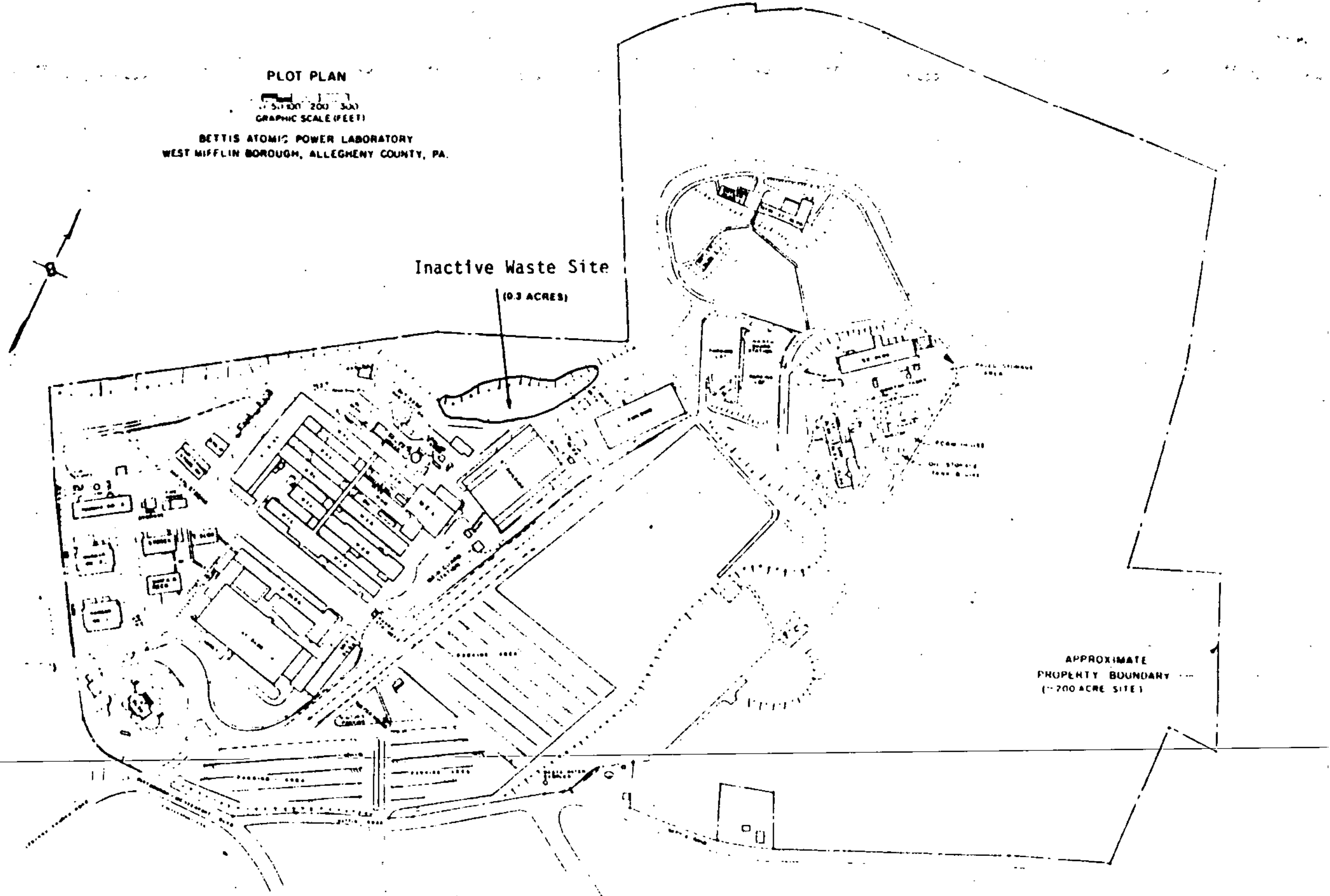
During the meetings, old site photographs were reviewed and discussed. The conclusions of the meetings and discussions were the following:

- The storm and sanitary sewers were used to dispose of many of the wastes produced at the Laboratory in the past between 1949 and the mid-1970s.

- No major spills of materials were remembered. Consistent with standard industrial practice at that time, the early policy was generally to wash the material down a storm or sanitary drain. This might have been preceded by some efforts to reduce the toxicity or hazard, i.e., neutralization of acids and bases. This policy changed when environmental concerns received more attention in the late 60s and early 70s. At that point spills were given more attention and were cleaned and controlled by better means.

- Onsite disposal of significant quantities of waste was not a common practice. However, a potential location used to dump plant debris and some chemicals was identified. This area is located on a hillside shown on Figure 8. This site came to be known as the Bettis inactive waste site. The site was active from 1950 until approximately 1964. The hillside was used to dispose of a variety of materials but mainly materials such as wood, plaster, and other building materials. The site was used also to dispose of soil and

FIGURE 8: LOCATION OF INACTIVE WASTE SITE



rock from various construction projects onsite. It was recalled that materials such as asbestos insulation from piping were dumped at the hillside. Chemicals such as neutralized sludge, oils, vapor blast grit, paint cans, and solvents such as trichloroethylene, perchloroethylene, and some benzene from machine cleaning were all thought to have been dumped at the hillside. No one could estimate the quantity of waste dumped except that a significant quantity of asbestos probably was dumped at the site. There did not appear to have been many containers full of materials dumped at the site. Instead, the contents appeared to have been discharged at the site and the containers returned for reuse. Because the site was used as a dump for dirt, waste at the site is probably layered with dirt. The use of the hillside as a dump for wood and construction debris was discontinued in approximately 1959 when collected trash was hauled offsite to a landfill. The site, however, was probably used to dispose of other materials until approximately 1964. The site was used again in 1970-1971 as a dump for clean soil from a construction project.

- Bettis, in times past, had several locations onsite used for degreasing operations. These areas were thought to be potential locations of spills or leaks of degreasing compounds, although no spills or leaks could be identified.

- In approximately 1960, waste oil storage tanks were purchased and placed in the ground. This provided a location for the disposal of waste oil. This oil was then routinely collected from the tanks and taken offsite for disposal. These sites could be potential locations for spills or leaks.

In addition, previous members of the plant environmental control staff were contacted to discuss spill conditions and disposal practices. These individuals were cognizant of the environmental control program from approximately 1975 to 1981.

b. Review of Installation Information

In concert with discussions with present and former employes, a review of available documents was also conducted. Documents reviewed included Technical Work Records of environmental control personnel, purchase orders for waste disposal, Federal/State/Local permit documentation, environmental assessment documents, effluent monitoring reports, site maps and photographs, and incident reports. A discussion of the review findings are presented in the following sections.

1. Technical Work Records (TWRs)

This review indicated that Bettis has had an environmental control program for many years. The major concern in the early years was controlling the quality of the discharges, mainly storm sewer, leaving the facility. As was the practice of the day, many materials were commonly discharged into the storm sewers. The major items appeared to be foam-causing agents such as soaps and detergents and acidic and basic solutions. Positive actions were taken to control these types of discharges. Efforts were made to insure foaming agents were discharged into the sanitary sewer system. Discharges of both acidic and basic solutions mainly from resin regeneration were common until the middle 1970s. pH measurements of the effluents often revealed pH values as low as 3 pH units or as high as 11 for short periods after a discharge. These types of discharges were eliminated by administrative controls, neutralization units and use of vendors for offsite disposal. While the discharges of the acid and base solutions may have had a short term, local effect on the environment, the long term or residual effects of these discharges are not considered significant.

The TWRs also provided insight into waste management practices further discussed in the following sections.

2. Internal Reports

A review of internal reports of environmental affairs was conducted. Internal reports are an internal evaluation of an occurrence written in sufficient detail to allow for the assessment of the significance and the means for avoiding a recurrence.

The majority of the internal reports reviewed dealt with discharges to sewer systems where pH standards were exceeded. The source of the discharges was generally found to be the result of minor operational errors. The reports did include some minor spill situations.

3. Purchase Orders and Waste Management

A review of some past purchase orders and discussions with Laboratory staff revealed that Bettis has frequently used offsite vendors to dispose of a variety of wastes. Records show that vendors were used at least by the early 1970s to dispose of waste acid solutions. Materials removed from waste oil tanks had been sent offsite since the tanks were installed in the early 1960s. Waste contracts were also established to dispose of waste resin regeneration solutions and miscellaneous chemical wastes.

The chemicals used at Bettis in the most significant quantities over the years of operation have been the following:

- acids and bases (for pickling and ion exchange resin regeneration and neutralization)

- solvents (for degreasing)

- oils (for lubrication)

Acids used for pickling were collected in a 5000-gallon tank and sent offsite for disposal at a vendor facility. The 5000-gallon tank was removed from service and closed following a formal closure plan in 1985. The tank has since been dismantled.

Acids and bases used in ion resin regeneration resulted in low and high pH solutions requiring disposal. Disposal practices for these solutions have included neutralization and subsequent discharge to onsite storm or sanitary sewers and removal to an offsite vendor facility by tank truck for disposal.

Solvents including materials such as tetrachloroethylene, toluene, oxylene and alcohols have been used onsite for degreasing operations. In some cases these solvents were allowed to evaporate during use. Records indicate that the solvents may have been placed in the waste oil tanks around the Laboratory. Solvents were also collected and sent offsite for disposal. Past disposal contracts reviewed included provisions for solvent disposal. Currently, the solvents are handled according to applicable waste disposal regulations.

In approximately 1960, 10 waste oil tanks were installed at the Laboratory for the collection of waste oil. The oil removed from the tanks was disposed of through offsite vendors. The use of the waste oil tanks was discontinued in late 1979 and the tank contents were pumped out. Some of these tanks were found to contain PCBs and some solvents. Future plans call for the removal of these tanks. At that time, a determination of the extent of leakage and spillage around the tanks will be ascertained. At this time, leakage does not appear to be a problem based on the fact that most of the tanks still contain a small residual of oil indicating tank integrity. After elimination of the tanks for collection, waste oil was and still is placed in 55-gallon drums for shipment to offsite reclamation facilities. The drums have been and are stored in diked storage areas.

The miscellaneous chemical wastes produced by the Laboratory have been disposed of by disposition into the storm or sanitary sewer systems or by removal by a waste disposal vendor. Discussions with personnel who had environmental control responsibilities indicate that contracts were placed with outside vendors by at least the 1970s for miscellaneous chemical disposal. Since that time, three main storage areas have been used to store the waste chemicals prior to shipment: a concrete pad area (used until 1979); the waste storage pad (used until 1984); and the current storage building. Record reviews and interviews did not indicate the occurrence of any major spills in these areas that would have resulted in environmental contamination. The two outdoor areas are no longer used for waste storage. A closure plan was written for the waste storage pad. Currently, miscellaneous chemicals are handled according to RCRA and other applicable regulations.

4. Federal/State/Local Permit Documentations

The Bettis Laboratory National Pollutant Discharge Elimination System (NPDES) Permit documentation was reviewed. This revealed no indication of onsite disposal locations. Documentation for the required Allegheny County Air Pollution Control Permits also did not provide any information on disposal practices.

5. Effluent Monitoring Reports

Bettis storm sewer monitoring data are provided in each annual environmental monitoring report. These reports provided no indication of any detrimental environmental effects from the Laboratory. (See Section 4.d for additional data on effluent monitoring.)

6. Miscellaneous Documents

Other pertinent miscellaneous documents such as drawings were reviewed. Included in these documents was information on the Bettis Air Field. Drawings indicate that the air field buildings were served by septic tanks until the Bettis onsite sewage plant was constructed in approximately 1950. One underground oil tank associated with the air field was also noted. There was no evidence to specifically implicate prior air field operations as a cause of any current environmental conditions.

c. Potential Disposal Site Location Evaluation

The investigation for potential waste disposal sites conducted in 1983 identified that a portion of the hillside on the northwest side of the site was used to dispose of clean-fill from various plant excavation and construction jobs. This area is identified as the inactive waste site. The area was also used to dispose of various waste from the plant including materials such as waste wood, plant debris and some chemical wastes. See Figure 8 for a location map of the inactive waste site.

In the spring of 1984 Bettis initiated sampling of springs and seeps around the Bettis site to check for the presence of chemical contaminants. Samples of ponding water collected at the base of the hillside revealed the presence of low levels of man-made organics such as tetrachloroethylene (see Appendix B). At the same time, samples of spring water from the Buono Spring also indicated the presence of the same man-made organics. The Buono Spring is located east of the main site (see Figure 7).

In the fall of 1985 Bettis implemented a drilling program to verify the presence of contaminants in the inactive waste site. As part of the drilling project, monitoring wells were also installed in the Buono Spring area.

1. Drilling Locations

   Bores were made across the top, the middle and the bottom of the inactive waste site. The locations of the bores were selected based on site characteristics and accessibility. There were several nodes on the hill where waste was thought to have been dumped. These were selected for bore locations. Other bore locations on the top were picked because they were accessible to the drilling rig. Bore locations on the bench and base of the hill were selected to envelop and bisect the top bores. The location of holes drilled on the bottom (base) of the inactive waste site are approximately one hundred feet from the property boundary. The area of the inactive waste site was manually defoliated prior to initiation of the drilling as part of a security related project. Seventeen holes were drilled in the inactive waste site area and three were drilled near Buono Spring (see Figure 7).

2. Drilling Methods

   Drilling was conducted using several different methods. Standard 18" split spoon sampling was used as the major method. Continuous split spoon samples were collected until penetration could not longer be achieved. No penetration was defined as no advancement of the spoon in one hundred blows.

All samples retrieved using the spoon were collected and placed in new glass jars by the driller. Each jar was identified by bore number, depth and the number of blows per one-half foot of advancement.

Augering was also used to advance the split spoon and as a drilling method in selected holes. A six-inch auger was used. Five foot sections were augered before the cuttings were raised. Rock coring was used in one hole to advance into the rock layer. In any borings where water was encountered the water level was measured during drilling and 24 hours later. The driller maintained logs of each hole. Copies of the logs were submitted to Bettis as part of the driller's project report. Logs included information on soil or rock color, type and any abnormalities noted. The abnormalities would include specific types of debris, fibrous materials or odors. In those cases where an abnormality was noted, a sample of the material was collected. All drilling was observed by a Bettis representative.

3. Soil and Water Sampling

Prior to initiating drilling and sampling, a review was conducted of the types of tests that could be conducted on the soil and water samples. This list of potential tests was based on the preliminary information gathered on the types of materials that may have been disposed in the hillside. Appropriate tests were then selected from this master list.

Soil samples were collected during drilling. Samples were collected for asbestos, volatile organics, polychlorinated biphenyls (PCBs) and for extraction procedure testing. Each sample was placed in a container that met sampling protocols for that parameter. Each sample was assigned a numerical number. The sample number, bore number, depth of sampling and sample type were immediately entered into a log book.

All samples and cores became the property of Bettis and were maintained for further analysis and evaluation. All soil samples collected by the driller were reexamined after the drilling. Samples were reexamined for soil type and the presence of visible contaminants and odors. From this reexamination, samples were selected for submittal for additional analysis.

4. Well Installation

Wells were installed in each of the core borings. This was done even if the boring did not encounter water so the well could serve as a collection point for water percolating through the fill. Each well casing was Schedule 40 PVC. Sections of casing were screwed together. No glues were used to connect the casing sections. In each well a five-foot PVC well screen was used at the well bottom. The annular space around each casing was filled with selected materials. Basically each annular space included gravel, bentonite and cement. The gravel was a fine silica gravel. Bentonite was added as pellets.

All wells had a metal lockable cap placed in the top cement seal. Padlocks were placed on each cap. Wells 1-3 and 16-20 had cutting removed by the injection of compressed air following drilling by the well driller.

5. Odors

During the drilling and sample examination, odors were noted in certain holes and samples. The odors encountered were generally a strong organic solvent type odor. A list of bores and the depths where odors were noted is provided in Appendix C.

6. Groundwater Sampling

Groundwater was collected from the wells containing water using a teflon bailer or Kemmerer type well sampler. Generally, each well had a minimum of one casing volume of water removed prior to sample collection. A sampling information sheet was completed for each well which contained information on the depth to water, water temperature, sample appearance, sample pH, weather conditions and any special conditions noted. Samples were collected and analyzed from each well where water was available. Each sample was preserved using the prescribed preservatives and handling techniques. Each sample was then analyzed by a qualified outside vendor for the selected parameters using approved analytical methods. Samples were also collected from wells drilled in the vicinity of the Buono Farm Spring.

7. Chemistry Analysis Results (11, 12, 13)

The results of chemical analysis conducted on the soil samples collected from the inactive waste site and water from the wells at the site are presented in Appendix C.

The chemistry results of the soil samples collected from the hillside revealed the presence of selected organics and asbestos. Table 6 presents a synopsis of the soil data. Tetrachloroethylene, a common degreaser, was the predominant organic contaminant identified.

Analysis of the samples of the well water collected from the monitoring wells installed at the inactive waste site and the Buono Spring area revealed the presence of organic contaminants. Again tetrachloroethylene was the predominant contaminant identified. High concentrations of organics, up to 28,000 ppb of tetrachloroethylene, were found in the water from the wells in the inactive waste site. Significantly lower levels of organics were found in the wells in the Buono Spring area.

The tetrachloroethylene and trichloroethylene found in the soil and groundwater most likely originate from past activities at Bettis such as disposal, leaks or spills. It is also possible that these compounds could have originated from operations of the old Bettis Air Field. The 1,2-trans-dichloroethylene and the 1,1 dichloroethylene probably are the result of in-situ degradation of the tetrachloroethylene and the trichloroethylene. The other volatile organic compounds present probably result from Bettis activities. The asbestos found in the inactive waste site also probably results from past Bettis disposal activities.

The levels of organics found in the groundwater samples were compared to the few standards available for such compounds. The EPA, under the rules of the National Primary Drinking Water Regulations, has set a recommended maximum contaminant level (RMCL) for benzene and trichloroethylene in drinking water at zero. The anticipated RMCL for tetrachloroethylene will probably also be zero. The RMCL for 1,1 dichloroethylene is 7 ppb. An RMCL is the maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health of persons would occur and which includes an adequate margin of safety. The RMCLs set at zero are based on suspected carcinogenic effects of the compounds. The levels of organic contaminants in the groundwater exceed their RMCL values. There are no known users of the groundwater sampled at Bettis (Reference 6).

TABLE 6

SUMMARY OF SOIL ANALYSIS RESULTS INACTIVE WASTE SITE

Contaminant	Number of Bores In Which Contaminant Detected Above MDL *	Contaminant Concentration Range Above MDL (ppb)
Asbestos	2**	NA
Chloroform	1	360
1,2-Trans-Dichloroethylene	2	360-3900
Polychlorinated Biphenyls	3	1,000-42,000
Tetrachloroethylene	7	270-236,000
Toluene	1	300
1,1,1 Trichloroethane	1	110
Trichloroethylene	4	56-3,400

*Total number of bores is seventeen. MDL - Maximum Detectable Limit, see Appendix C for MDL values for compounds. All results for EP Toxicity analysis (metals only) were lower than the maximum concentration limit; see Appendix C for maximum concentration limit.

**This indicates the number of samples that tested positive for asbestos.

Most of the groundwater seeps and springs onsite discharge into Bull Run. The average levels of tetrachloroethylene and trichloroethylene found in Bull Run at the property boundary have been less than detectable. The levels at the site boundary are also less than the levels established for acute and chronic toxicity to freshwater aquatic life which are 5,280 ppb and 840 ppb, respectively, for tetrachloroethylene and 45,000 ppb for acute toxicity for trichloroethylene.

6. CONCLUSIONS

The following conclusions are presented based on the information gathered and reviewed as part of the CERCLA Phase I Assessment for the Bettis Atomic Power Laboratory.

- Investigations indicated the presence of an inactive waste site. Preliminary investigations involving core borings, sample collection and analyses revealed the presence of organic solvents, asbestos and PCBs in the soil at the site and solvents in groundwater monitoring wells below the site. The same organics found in the inactive waste site have been found in springs located on other portions of the Bettis site in concentrations above background. The origin of these solvents could include past disposal of the material, leaking equipment, sewers, tanks or poor housekeeping practices. Some of the organics are thought to be degradation products of the original solvents.

- No significant onsite land disposal of waste materials, other than at the inactive waste site, occurred at Bettis. Minor leaks and spills may have been associated with other units at Bettis such as degreasing units, sewers and underground waste oil tanks. No evidence of significant spills of hazardous materials could be identified.

- The Hazard Ranking System (HRS) evaluation of the organic contamination at Bettis resulted in a low overall score (6.8 out of a possible score of 100). Based on this score and current site knowledge, there does not appear to be an undue risk to health, safety and the environment from the inactive waste site.

7. RECOMMENDATIONS

Based on the results of the Phase I-Assessment and the hazard ranking completed for the site, there appears to be no undue risk to health, safety and the environment from the Bettis Atomic Power Laboratory. Therefore, in accordance with the guidance in DOE Order 5480.14, no futher actions are required to comply with the provisions of the Order. However, Bettis intends to continue environmental monitoring activities to confirm that the conclusions of this report do not change. Furthermore, any evaluations or corrective actions that may be required by environmental statutes will be performed as applicable.

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APPENDIX A

1985 INFLUENT AND EFFLUENT WATER QUALITY DATA

TABLE A-1

ANNUAL SUMMARY OF INFLUENT AND EFFLUENT WATER QUALITY ANALYSES, CY 1985

Parameters	Units	Standard/ Guideline	Minimum Detectable Level (MDL)	Municipal Influent Water Min.	Municipal Influent Water Max.	Municipal Influent Water Mean ± S*	Bull Run Effluent Min.	Bull Run Effluent Max.	Bull Run Effluent Mean ± S*	Northeast Area Effluent Min.	Northeast Area Effluent Max.	Northeast Area Effluent Mean ± S*
Alkalinity	mg/l as $CaCO_3$	J20 (b)	1	20	42	28±9	28	59	40±12	26	84	52±21
Aluminum	mg/l	0.5 (b)	0.1	0.08	0.1	0.09	0.1	0.4	0.26	0.08	0.47	0.23
Arsenic	mg/l	0.05 (b)	0.002 (f)	<0.002	0.004	<0.003	<0.002	0.007	<0.003	<0.002	0.009	<0.004
Chromium (Hexavalent)	mg/l	0.05 (b)	0.01 (f)	<0.01	<0.03	<0.02	<0.01	<0.03	<0.02	<0.01	<0.03	<0.02
Copper	mg/l	0.05 (b)	0.01	<0.01	0.03	<0.02	<0.02	0.09	<0.05	<0.02	0.07	<0.04
Cyanide, Free	mg/l	0.005 (b)	0.005 (f)	<0.005	<0.02	<0.01	<0.005	<0.02	<0.01	<0.005	<0.02	<0.02
Dissolved Oxygen	mg/l	>4.0 (b)	0.1	4	8	7	6	8	8	5	8	7
Fecal Coliform	Colonies/ 100 ml	200 Colonies/ 100 ml (d) May 1 to Sept. 30; 2,000 Colonies/ 100 ml (d) Oct. 1 to April 30	1	1 (g)	1 (g)	NA	<6	66	NA	16	134	NA
Fluoride	mg/l	2.0 (b)	0.01	0.35	0.9	0.66±0.2	0.53	0.88	0.77±0.14	0.3	0.88	0.62±0.23
Iron, Dissolved	mg/l	0.3 (b)	0.02 (f)	<0.02	0.03	<0.025	<0.02	0.295	0.12±0.11	0.05	0.43	0.23±0.16
Iron, Total	mg/l	1.5 (b)	0.02	<0.02	<0.03	<0.024	<0.03	1.37	<0.45	0.27	0.96	0.58±0.25
Lead	mg/l	0.05 (b)	0.01	<0.01	0.05	<0.017	<0.01	0.06	0.03±0.02	<0.01	0.037	0.021±0.01
Nickel	mg/l	0.05 (b)	0.02 (f)	<0.02	<0.04	<0.03	<0.02	<0.04	<0.03	<0.02	0.05	<0.04
Nitrate & Nitrite as N	mg/l	10 (b)	0.005	1.01	1.51	1.15±0.2	1.01	2.49	1.57±0.6	1.11	2.62	1.66±0.6
Oil & Grease	mg/l	30 (c)	1.0	<1	5	<2	1	8	4	1	2	1.25
pH	pH units	6.0-9.0 (a)	0.1	6.8	7.4	7.0	6.7	7.9	7.1	6.7	8.6	7.2
Phenols	mg/l	0.005 (b)	0.002	<0.002	0.006	<0.003	<0.002	0.016	F0.005	<0.002	0.003	<0.002
Solids, Dissolved	mg/l	1500 (b)	1	169	191	176±9	216	952	528±278	240	1104	561±330
Solids, Suspended	mg/l	25 (Ave) (a) 50 (Max)	1	<1	9	<1.9	<1	25	<7.8	<1.0	22	F8.1
Temperature	°F	87 (a)		37	79	60±15	41	81	61±12	42	84	63±14
Threshold Odor No.	Threshold No.	24 (b)		1	2	1.6	1.4	2	1.8	1	2	1.6
Total Organic Carbon	mg/l	- - (e)	0.1	1.52	2.69	1.9±0.5	2.58	4.47	3.45±0.9	3.08	8.29	5.3±2.4
Zinc	mg/l	0.05 (b)	0.01	0.14	0.19	0.17±0.02	0.21	0.35	0.26±0.06	0.24	0.41	0.30±0.08

* s is the standard deviation associated with the sample set. s may be large due to a small sample set. The lowest possible value of any parameter is zero.

N/A signifies not applicable.

(a) Based on the National Pollutant Discharge Elimination System Permit for the Bettis Atomic Power Laboratory, issued July 28, 1977. Standards for suspended solids based on 24 hr composite samples.

(b) Based on the Pennsylvania Code, Title 25, Environmental Resources, Chapter 93 - Water Quality Standards.

(c) Based on the Pennsylvania Code, Title 25, Environmental Resources, Chapter 97 - Industrial Waste.

(d) Based on the Pennsylvania Code, Title 25, Environmental Resources, Chapter 93 - Water Quality Standards. Guidelines are geometric mean values of five consecutive samples.

(e) No specific limits apply to Total Organic Carbon; however, this parameter represents the amount of organic materials present in the effluent.

(f) Some higher minimum detectable levels (MDL) encountered due to sample chemistry and interferences.

(g) The values reported as "Min" and "Max" for fecal coliforms are the geometric mean values of five consecutive samples.

Note: Municipal water samples are grab samples. Effluent samples of aluminum, arsenic, chromium, copper, fluoride, total iron, dissolved iron, lead, nickel, suspended solids, dissolved solids and zinc are 24 hour composite samples. All other effluent samples are grab samples.

TABLE A-2

Annual Sample Results of Influent and Effluent Water Quality Analyses, CY 1985

Parameter	Units	Guideline*	Municipal Influent Water	Bull Run Effluent	Northeast Area Effluent
Ammonia (as N)	mg/l	**	2.26	2.62	2.15
Boron	mg/l	**	<0.2	<0.2	<0.2
Chemical Oxygen Demand	mg/l	**	2.20	3.36	2.2
Chloride	mg/l	150	16	57	4.5
Chromium, Total	mg/l	**	<0.01	<0.01	<0.01
Color	Color Units	50 Units	1	2	2
Cyanide, Total	mg/l	**	<0.02	<0.02	<0.02
Organic Nitrogen	mg/l	**	2.48	2.34	1.8
Potassium	mg/l	**	1.46	2.12	1.97
Sodium	mg/l	**	8.8	33.5	19.6
Specific Conductance	μmhos/cm	**	260	459	372
Surfactants	mg/l	0.5	<0.016	0.024	0.018

*Based on Pennsyvlania Code, Title 25, Environmental Resources, Chapter 93 - Water Quality Standards
**No Guideline available

APPENDIX B

1985 GROUNDWATER MONITORING RESULTS

TABLE B-1

Summary of Influent, Effluent and Groundwater Volatile Halogenated and Aromatic Organics[1]

Sample Media	City Water Influent	Bull Run Effluent	Northeast Area Effluent	Bull Run Spring	Buono Spring	BR-NA Confluence	Northeast Spring	Springhouse Spring
Halogenated Organics	Range of Results (PPB)[2]							
Dichloromethane	5-187	39	20	22	21	MDL	MDL-21	MDL-23
Chloroform	19-58	MDL-20	MDL-35	MDL-10	MDL-36	MDL-6	MDL-3	MDL
Bromodichloromethane	MDL-85	MDL-9	MDL-13	MDL-10	MDL	MDL	MDL	MDL
Dibromochloromethane	MDL-9	MDL-4	MDL-6	MDL-4	MDL	MDL	MDL	MDL
1,1,1-Trichloroethane	MDL-2	MDL	MDL-6	MDL-2	MDL-2	MDL	MDL	MDL
1,1,2-Trichloroethane	MDL	MDL	MDL	MDL	MDL	MDL	MDL-10	MDL
Trans-1,2-Dichloroethylene	MDL	MDL	MDL	MDL	MDL-110	MDL		
Trichloroethylene	MDL	MDL	MDL-16	MDL-4	MDL-120	MDL	MDL-4	MDL
Tetrachloroethylene	MDL	MDL-4	MDL-16	MDL-2	11-810	MDL-2	MDL-44	MDL

	Well #1	Well #2	Well #3	Well #4	Well #5	Well #11	Well #16	Well #17	Well #18	Well #19	Well #20
1,2-Trans-Dichloroethylene	9.6	--	95	--	--	895	19	2,500	740	1,500	420
Tetrachloroethylene	255	--	480	12,000	81	1,000	17	435	28,000	11,500	3,000
Trichloroethylene	7.6	--	38	34	6.2	135	3.6	725	1,400	1,150	600
~~1,1-Dichloroethylene~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~53~~	~~7.2~~	~~--~~
Benzene	--	--	--	--	--	--	--	13	7.7	--	--
Toluene	--	--	--	3.7	--	--	--	19	--	--	--
Xylene	--	--	--	3.8	--	--	--	325	19	--	--

(1) Purgeable Halogenated Organics is synonymous with Volatile Organic Compounds.
(2) Only rounded, positive results are reported. MDL = Minimum Detection Level, typically 1 PPB.

APPENDIX C

SOIL AND GROUNDWATER RESULTS

INACTIVE WASTE SITE

TABLE C-1

BETTIS LABORATORY
INACTIVE WASTE SITE

SOIL SAMPLE RESULTS, 1985

Bore Number	Sample Depth (ft)	Bettis Sample Number	Type of Sample	Sample Results
4	4.5-6	107	EP Toxicity(1)	All results less than limits
	7	1	Asbestos	Positive
	7.5-9	109	Asbestos	Positive
	12 - 13.5 (B)	110	VOC(2)	Tetrachloroethylene - 900 ppb
	21 - 22.5 (T)	112	VOC	All less than detectable
	21 - 22.5 (B)	2	VOC	All less than detectable
5	6 - 7.5 (M)	114	EP Toxicity	All results less than limits
	19 - 20.5	117	PCB	< 2 ppm
	21	4	VOC	All less than detectable
	22 - 23.5	118	Asbestos	Negative
6	4.5-6 (B)	120	VOC	All less than detectable
	12 - 13.5 (T)	121	VOC	Tetrachloroethylene - 1100 ppb
	16.5 - 18	122	EP Toxicity	All results less than limits
	21	5	VOC	All less than detectable
	25.5 - 27 (B)	123	VOC	All less than detectable

TABLE C-1 (Continued)

Bore Number	Sample Depth (ft)	Bettis Sample Number	Type of Sample	Sample Results
7	21 - 22.5 (T&B)	125	VOC	All less than detectable
8	20	15	EP Toxicity	All results less than limits
	21 - 22.5	129	PCB	< 2 ppm
	27 - 28.5	130	VOC	All less than detectable
9	10.5 - 12	132	VOC	Tetrachloroethylene - 12,000 ppb Trichloroethylene - 270 ppb
	12 - 13.5	133	PCB	Arochlor 1248 - 13.8 ppm Arochlor 1254 - 28.2 ppm
	15 - 16.5 (B)	134	Asbestos	Positive
	16.5 - 18 (T)	135	Asbestos	Positive
	33 - 34.5	34	VOC	Tetrachloroethylene - 270 ppb 1,2-trans-Dichloroethylene -360 ppb Trichloroethylene - 56 ppb
	37.5 - 39 (B)	137	VOC	All less than detectable
10	8	36	VOC	Tetrachloroethylene - 236,000 ppb 1, 2-trans-Dichloroethylene - 3,900 ppb Trichloroethylene - 3,400 ppb
	15	38	VOC	Tetrachloroethylene - 24,000 ppb
	15	39	EP Toxicity	All results less than limits

TABLE C-1 (Continued)

Bore Number	Sample Depth (ft)	Bettis Sample Number	Type of Sample	Sample Results
	21 - 22.5 (B)	139	PCB	Arochlor 1248 - <1.0 ppm Arochlor 1254 - 1.1 ppm
	24 - 25.5 (T)	140	VOC	All less than detectable
11	9	47	VOC	Tetrachloroethylene - 158,000 ppb
	15	49	VOC	Tetrachloroethylene - 19,000 ppb
	15	50	EP Toxicity	All results less than limits
	21 - 22.5 (B)	143	VOC	All less than detectable
12	10.5 - 12 (B)	146	VOC	All less than detectable
13	10 - 15 (A)	169	PCB	Arochlor 1248 - 3.2 ppm Arochlor 1254 - 9.9 ppm
	20 - 25 (A)	60	EP Toxicity	All results less than limits
	20 - 25 (A)	61	VOC	All less than detectable
14	15 - 20 (A)	149	VOC	All less than detectable
15	20 - 25 (A)	153*	VOC	Tetrachloroethylene - 4,800 ppb
	20 - 25 (A)	152	VOC	All less than detectable
16	15 - 20 (A)	156	VOC	All less than detectable
	30 - 35 (A)	158	VOC	All less than detectable

*Sample spiked with tetrachloroethylene

TABLE C-1 (Continued)

Bore Number	Sample Depth (ft)	Bettis Sample Number	Type of Sample	Sample Results
17	10	82	VOC	1,1,1 Trichloroethane - 110 ppb Trichloroethylene - 100 ppb
	15	84	VOC	Toluene - 300 ppb
	15-20(A)	159	PCB	<2.0 ppm
	25	87	VOC	All less than detectable
	25	88	EP Toxicity	All results less than limits
18	5 - 10 (A)	160	VOC	All less than detectable
	25 - 30 (A)	162	VOC	Tetrachloroethylene - 2500 ppb Chloroform - 360 ppb
19	5 - 10 (A)	167	EP Toxicity	All results less than limits
	10 -15 (A)	170	PCB	<2 ppm
	10 - 15 (A)	163	VOC	All less than detectable
	35 - 40 (A)	164	VOC	Tetracholoroethylene - 1,100 ppb Trichloroethylene - 130 ppb
20	10 - 15 (A)	168	EP Toxicity	All results less than limits
	25 - 30 (A)	166	VOC	All less than detectable

(B) - Sample collected from bottom jar of corresponding depth interval
(T) - Sample collected from top jar of corresponding depth interval
(A) - Auger Sample
VOC - Volatile Organic Compounds

TABLE C-1 (Continued)

(1) Samples analyzed per the Extraction Procedure Test as specified in SW-846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" - Method 1310. The extract was analyzed for the following parameters:

Parameters	Maximum Concentration Limit (mg/l)
Arsenic	5.0
Barium	100.0
Cadmium	1.0
Chromium (Hexavalent)	5.0
Chromium (Total)	5.0
Lead	5.0
Mercury	0.2
Selenium	1.0
Silver	5.0

(2) Volatile Organic Compound (VOC) samples were analyzed for the parameters on the following list. The analysis was conducted using the methods outlined in SW-846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods".

Parameter	Detection Limit (ug/l)
Benzene	20
Bromoform	500
Carbon Tetrachloride	500
Chlorobenzene	20
Chlorodibromomethane	500
Chloroform	100
1,2-Dichlorobenzene	100
1,3-Dichlorobenzene	100
1,4-Dichlorobenzene	100
Dichlorobromomethane	250
1,1-Dichloroethane	100
1,2-Dichloroethane	100
1,1-Dichloroethylene	250
1,2-Dichloropropane	100
Ethyl Benzene	20
Methylene Chloride	250
Trans-1,3-Dichloropropylene	250
1,1,2,2-Tetrachloroethane	250
Tetrachloroethylene	250
Toluene	20
1,2 Trans-dichloroethylene	100
1,1,1-Trichloroethane	100
1,1,2-Trichloroethane	100
Trichloroethylene	100

TABLE C-2

SUMMARY OF MONITORING RESULTS FOR WELL WATER SAMPLES: 1985

Sample Date: December 3, 1985

Parameter	WELL NUMBER 1	2	3	4	5	11	16	17	18	19	20
Drinking Water Suitability Characteristics (mg/l)											
Arsenic	0.006	0.006	0.004				<0.002	<0.002	<0.002	<0.002	<0.002
Barium	0.1	0.2	0.2		(1)		0.1	<0.1	0.1	0.1	0.1
Cadmium	0.02	0.01	0.02				0.02	0.01	0.01	0.02	0.01
Chromium (Hexavalent)	<0.01	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01
Fluoride	0.2	0.1	0.2				0.1	0.5	0.2	0.2	0.2
Lead	<0.05	<0.05	<0.05				<0.05	<0.05	<0.05	<0.05	<0.05
Mercury	0.0002	0.0003	0.0003				<0.0002	<0.0002	<0.0002	0.0004	<0.0002
Nitrate-N	1.0	0.19	1.8				<0.01	0.08	2.9	3.1	4.2
Selenium	0.004	<0.002	0.002				<0.002	<0.002	<0.002	<0.002	<0.002
Silver	<0.01	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01
Groundwater Quality Characteristics (mg/l)											
Chloride	92	390	895				275	32	350	140	135
Iron	2.0	18	11		(1)		2.6	1.2	0.95	3.5	0.15
Manganese	0.07	0.15	0.03				0.57	1.7	0.95	0.27	0.01
Sodium	40	65	250				55	50	68	65	68
Sulfate	245	105	185				240	560	325	395	280
Groundwater Contamination Indicators											
pH (pH units)	6.5	6.8	6.7				6.6	6.8	6.7	6.6	6.8
Specific Conductance (μ mhos/cm^2)	1180	2110	3600		(1)		2090	1600	2350	1980	1710
Total Organic Carbon (mg/l)	<2	<2	<2				4	7	<2	8	<2
Total Organic Halide (ug/l)	150	55	215				42	790	6920	5135	1205
Polychlorinated Biphenyls (ug/l)	<1	<1	<1		(1)		<1	<1	<1	<1	<1

TABLE C-2 (Continued)

SUMMARY OF MONITORING RESULTS FOR WELL WATER SAMPLES: 1985

Sample Date: December 3, 1985

Parameter	WELL NUMBER 1	2	3	4	5	11	16	17	18	19	20
Volatile Organic Compounds (ug/l)(2)											
1,2-Trans-Dichloroethylene	9.6	--	95	--	--	895	19	2,500	740	1,500	420
Tetrachloroethylene	255	--	480	12,000	81	1,000	17	435	28,000	11,500	3,000
Trichloroethylene	7.6	--	38	34	6.2	135	3.6	725	1,400	1,150	600
1,1-Dichloroethylene	--	--	--	--	--	--	--	--	53	7.2	--
Benzene	--	--	--	--	--	--	--	13	7.7	--	--
Toluene	--	--	--	3.7	--	--	--	19	--	--	--
Xylene	--	--	--	3.8	--	--	--	325	19	--	--

(1) Insufficient sample present for these analyses.
(2) Only those compounds which were detected in one or more sample are listed. All non-listed values were less than MDL.

TABLE C-3

ODORS DETECTED IN DRILLING SAMPLES

Bore Number	Depth (ft)	Type of Odor
4	21-24	S
6	3-6	S
	10.5-13.5	S
7	6-7.5	A
9	4.5-10.5	S
	10.5-12.0	S
	12-15	0
	21-27.0	S
	33-35.0	S
10	4.5-6.0	S
	7.5-9.0	0
	12-18	S
	21-22	S
11	9.0-12	S
	16-18	S
17	Entire Depth	S
19	10-15	S
	35-40	S

S = Solvent type odor
0 = Oil odor
A = Asphalt odor

APPENDIX D

HAZARD RANKING SYSTEM

Facility name: Bettis Atomic Power Laboratory

Location: West Mifflin, PA

EPA Region: III

Person(s) in charge of the facility: U.S. Department of Energy - Pittsburgh Naval Reactors Office; Operated by Westinghouse Electric Corporation

Name of Reviewer: ____________ Date: ____________

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

This HRS was conducted for chemical contamination at the Bettis site. This evaluation includes the inactive waste site (landfill) where chemical contaminants have been detected. The hazardous substances detected onsite are primarily organic solvents such as tetrachloroethylene. The contamination routes of potential concern are groundwater and surface water. The airborne contamination route and fire and explosion are not of concern. Direct contact is not a major concern. Justifications for individual ratings are footnoted on individual work sheets.

Scores: S_M = 2.6 (S_{gw} = 4.5 S_{sw} = 0 S_a = 0)

S_{FE} = 0

S_{DC} = 4.2

HRS COVER SHEET

Ground Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 45[1]	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 3	2		6	
Net Precipitation	0 1 2 3	1		3	
Permeability of the Unsaturated Zone	0 1 2 3 N/A	1		3	
Physical State	0 1 2 3	1		3	
Total Route Characteristics Score				15	
3 Containment	0 1 2 3 N/A	1		3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 12 15 18[2]	1	18	18	
Hazardous Waste Quantity	0 1[3] 2 3 4 5 6 7 8	1	1	8	
Total Waste Characteristics Score			19	26	
5 Targets					3.5
Ground Water Use	0 1[4] 2 3	3	3	9	
Distance to Nearest Well/Population Served	0[5] 4 6 8 10 / 12 16 18 20 / 24 30 32 35 40	1	0	40	
Total Targets Score			3	49	
6 If line 1 is 45, multiply 1 x 4 x 5. If line 1 is 0, multiply 2 x 3 x 4 x 5			2565	57,330	
7 Divide line 6 by 57,330 and multiply by 100		S_{gw} =	4.5		

GROUND WATER ROUTE WORK SHEET

[1]Tetrachloroethylene and other halogenated hydrocarbons have been detected above background levels in wells and springs, therefore direct evidence of release exists.

[2]Tetrachloroethylene considered most hazardous.

[3]Estimate few drums of material dumped; use 1-40 category.

[4]Water is usable, but no known uses within 3 stream miles.

[5]No known potable wells within 3 stream miles of facility. Basic groundwater theory infers that for a location with the topography & subsurface conditions encountered at Bettis, a discontinuity in the aquifer should occur between the hazardous substances & all known wells.

Surface Water Route Work Sheet						
Rating Factor	**Assigned Value (Circle One)**		**Multi-plier**	**Score**	**Max. Score**	**Ref. (Section)**
[1] Observed Release	0 45[1]		1	45	45	4.1
If observed release is given a value of 45, proceed to line [4]. If observed release is given a value of 0, proceed to line [2].						
[2] Route Characteristics						4.2
Facility Slope and Intervening Terrain	0 1 2 3	N/A	1		3	
1-yr. 24-hr. Rainfall	0 1 2 3		1		3	
Distance to Nearest Surface Water	0 1 2 3		2		6	
Physical State	0 1 2 3		1		3	
	Total Route Characteristics Score				15	
[3] Containment	0 1 2 3	N/A	1		3	4.3
[4] Waste Characteristics						4.4
Toxicity/Persistence	0 3 6 9 12 15 18[2]		1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8		1	1	8	
	Total Waste Characteristics Score			19	26	
[5] Targets						4.5
Surface Water Use	0[3] 1 2 3		3	0	9	
Distance to a Sensitive Environment	0[4] 1 2 3		2	0	6	
Population Served/Distance to Water Intake Downstream	0[5] 4 6 8 10 12 16 18 20 24 30 32 35 40		1	0	40	
	Total Targets Score			0	55	
[6] If line [1] is 45, multiply [1] x [4] x [5] If line [1] is 0, multiply [2] x [3] x [4] x [5]				0	64,350	
[7] Divide line [6] by 64,350 and multiply by 100			S_{sw} =	0		

SURFACE WATER ROUTE WORK SHEET

[1]Tetrachloroethylene detected above background in Buono Spring and the Northeast spring.
[2]Use same score as groundwater since same material.
[3]No uses downstream within 3 stream miles of facility.
[4]No sensitive environment in area.
[5]No surface water intake within 3 stream miles of facility.

Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 [1] 45	1	0 [1]	45	5.1
Date and Location:					
Sampling Protocol:					
If line 1 is 0, the S_a = 0. Enter on line 5. If line 1 is 45, then proceed to line 2.					
2 Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			20	
3 Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
	Total Targets Score			39	
4 Multiply 1 x 2 x 3				35,100	
5 Divide line 4 by 35,100 and multiply by 100		S_a =	0		

AIR ROUTE WORK SHEET

1. No observed releases.

	s	s^2
Groundwater Route Score (S_{gw})	4.5	20.25
Surface Water Route Score (S_{sw})	0	0
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		20.25
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		4.5
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$		2.6

WORKSHEET FOR COMPUTING S_M

Fire and Explosion Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Containment	1 3	1	1	3	7.1
2 Waste Characteristics					7.2
Direct Evidence	0[1] 3	1	0	3	
Ignitability	0 1 2 3	1	0	3	
Reactivity	0 1 2 3	1	0	3	
Incompatibility	0 1 2 3	1	0	3	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	1	8	
	Total Waste Characteristics Score		1	20	
3 Targets					7.3
Distance to Nearest Population	0 1 2 3 4 5	1	0	5	
Distance to Nearest Building	0 1 2 3	1	0	3	
Distance to Sensitive Environment	0 1 2 3	1	0	3	
Land Use	0 1 2 3	1	0	3	
Population Within 2-Mile Radius	0 1 2 3 4 5	1	0	5	
Buildings Within 2-Mile Radius	0 1 2 3 4 5	1	0	5	
	Total Targets Score		0	24	
4 Multiply 1 x 2 x 3			0	1,440	
5 Divide line 4 by 1,440 and multiply by 100		S_{FE} =	0		

FIRE AND EXPLOSION WORK SHEET

No significant fire or explosion threat to the public or to sensitive environments.

1. This rating based on substances found in largest concentration (tetrachloroethylene and trichloroethylene). Some low flash point substances such as benzene, toluene and xylene have been found in groundwater and soil but at very low concentrations where fire is not a concern.

Direct Contact Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Incident	0 45	1	0	45	8.1
If line 1 is 45, proceed to line 4 If line 1 is 0, proceed to line 2					
2 Accessibility	0 1 2 3 [1]	1	1	3	8.2
3 Containment	0 15 [2]	1	15	15	8.3
4 Waste Characteristics Toxicity	0 1 2 3 [3]	5	15	15	8.4
5 Targets					8.5
Population Within a 1-Mile Radius	0 1 [4] 2 3 4 5	4	4	20	
Distance to a Critical Habitat	0 [5] 1 2 3	4	0	12	
Total Targets Score			4	32	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			900	21,600	
7 Divide line 6 by 21,600 and multiply by 100			S_{DC} = 4.2		

DIRECT CONTACT WORK SHEET

[1] Area posted as Government Property, No Trespassing and security force available. Offsite no controls but no evidence of significant offsite release, assign 1.
[2] Tetrachloroethylene in spring allows direct contact.
[3] Based on tetrachloroethylene toxicity.
[4] Population in 1 mile radius is ~6000. However Bettis is not an uncontrolled site, assign 1.
[5] No critical habitat within 1 mile of facility.

APPENDIX E

INSTALLATION ASSESSMENT TEAM QUALIFICATIONS

The Bettis Laboratory installation assessment team for the CERCLA Phase I report included members of Radiological Controls and Engineering's Radiation Health group. The Radiation Health group currently is cognizant of the radiological and non-radiological environmental programs at Bettis. The environmental programs include air, water and solid waste. Radiation Health is responsible for compliance at Bettis with federal, state and local laws including the Water Pollution Control Act, Clean Air Act, Resource Conservation and Recovery Act, Toxic Substances Control Act, and Comprehensive Environmental, Response, Compensation and Liability Act.

The Radiation Health assessment team consists of the group Manager, the Environmental Engineer, and the Environmental Technical Assistant.

Qualifications for the assessment team members include:

Manager

Education: BS in Chemistry
PhD in Inorganic Chemistry

Experience: Environmental Control Officer, U.S. Navy, for three years. Three years experience in radiological and non-radiological control at Bettis as Manager of Radiation Health. Responsibilities include overseeing of radiological and non-radiological data collection and evaluations for air, water and soils. Oversees site compliance with RCRA, TSCA, CERCLA and CWA, and radiological environmental rules and regulations.

Environmental Engineer

Education: BS in Biology
MS in Hygiene, Water Pollution Control
MS in Civil Engineering (Environmental Engineering)

License: Engineer in Training (EIT)

Experience: Over 10 years experience in environmental control including government, consulting and industry, including five years at the Bettis Laboratory. Experience prior to Bettis includes:

- evaluation of land disposal sites for municipal and industrial wastes for compliance with regulations and environmental impacts
- collection of water, solid waste, and soil samples for analysis
- data evaluation of water, waste, and soil sample analysis results
- supervision of monitoring well installation

- subsurface investigations for foundation and environmental studies
- landfill design and operation
- preparation of technical reports.

Bettis responsibilities include being cognizant professional for the Laboratory environmental control program. This includes Laboratory compliance with applicable requirements of RCRA, CERCLA, TSCA, and the CWA.

Environmental Technical Assistant

Education: Pursuing BS in Natural Sciences

Experience: Fourteen years experience at Bettis Laboratory. This includes six years as a chemical technician in various analytical chemistry labs at Bettis. Responsibilities included waste management for the analytical labs. As a member of the Radiation Health group, responsibilities have included evaluating Laboratory compliance with RCRA, TSCA, and water pollution control laws.

Appendix F

Glossary of Terms Used

Aquifer is a completely underground water resource.

Comprehensive Environmental Response, Compensation and Liability Act of 1980, (CERCLA) is the law passed by the U.S. Congress and implemented by EPA intended to correct environmental problems arising from past improper waste disposal. Commonly referred to as "Superfund".

Contamination is the presence of hazardous substances at levels which pose potential health and safety risks to the public, site workers, or occupants, or render some portion of the environment unsuitable for use.

Contractor for the purpose of this Order, is any DOE management contractor, prime contractor, or subcontractor subject ot DOE Acquisition Regulations (DEAR), Final Rule, 48 CFR CH. 949 FR 11922 (3-28-84), Section 952.233-71 "Safety and Health and Government Owned and Leased Facilities".

Decontamination is the process of reducing contamination to comply with applicable standards or criteria.

Discharge is the accidental or intentional release of hazardous materials or wastes.

Endangered Species are those animals, by virtue of their declining numbers, that are threatened with extinction.

Habitat is the region in which an organism is commonly found. The habitat does not include migration routes used by organisms during seasonal migrations.

Hazard Ranking System is the methodology used by EPA to evaluate the relative potential of inactive hazardous waste facilities to cause health or safety problems, ecological or environmental damage (see Appendix A, 40 CFR 300).

Hazardous Substance is: (1) any substance designated pursuant to Section 311 (b)(2)(A) of the Federal Water Pollution Control Act; (2) any element, compound, mixture, solution, or substance designated pursuant to Section 102 of CERCLA; (3) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act; (4) any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act; (5) any hazardous air pollutant listed under Section 112 of the Clean Air Act; (6) any imminently hazardous chemical substance or mixture with respect to which the Administrator of EPA has taken action pursuant to Section 7 of the Toxic Substances Control Act.

Hazardous Wastes are those wastes defined by EPA in 40 CFR 261 as hazardous wastes.

Inactive Hazardous Waste Disposal Site is an area where a hazardous substance has been deposited, stored, disposed of, or placed or otherwise come to be located. It can be any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly owned treatment works), well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, motor vehicle, rolling stock, or aircraft. Excluded are areas that have a permit issued, or have been accorded interim status under Subtitle C of the Solid Waste Disposal Act or the Memorandum of Understanding between the DOE and the EPA for hazardous waste and radioactive mixed waste management, or operated under the provisions of DOE 5480.2 and DOE 5820.2.

Incident is any occurrence, or unusual occurrence which resulted in injury to personnel, wildlife or the environment.

Inspection is the act of reviewing the characteristics of an item or location. Inspection does not include taking samples.

Installation Assessment is the determination of the hazards to human health or the environment caused by sites containing hazardous materials which are inadequately controlled.

Migration is the movement of hazardous substances from the disposal site by means of air, surface water, or groundwater.

Resource Conservation and Recovery Act of 1976 (RCRA) is a law passed by the U.S. Congress and implemented by the U.S. EPA. RCRA controls the management of hazardous wastes from generation to final disposal.

Surface Waters are those aquatic resources which exist entirely (or nearly so) on the surface. Surface waters include lakes, rivers and wetlands.

Waste Disposal is discarding of materials which have served their intended purposes and are no longer needed.

Waste Generation is the action which first causes a material to be spent or useless.

Wetlands are areas saturated or nearly saturated with water. Wetlands include swamps, marshes and bogs.